MAP SHOWING ROUTE OF INDO-CHINESE SECTION OF KELLEY–ROOSEVELTS ASIATIC EXPEDITION

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The William V. Kelley–Roosevelts Asiatic Expedition of Field Museum in 1928–29, by division into three sections, was able to cover a wide extent of territory in central and southeastern Asia. Each section touched faunal areas not reached by the others and the resulting collection of mammals is one of unusual size, variety, and interest. The species represented are from such diverse regions as the tropical coast of Cochin China and the lofty mountains of western Szechwan toward the borders of Thibet. Nevertheless, it seems best to record the entire collection in a single report. In fact, as appears later, there are advantages in doing so, for western China, in spite of its temperate climate, has a mammalian fauna many elements of which extend into French Indo-China.

The expedition, so liberally financed by the late William V. Kelley, a Trustee and Benefactor of Field Museum, was one of the best equipped ever to take the field in Asia and, considering the short time of actual operations, the results are quite remarkable. Colonel Theodore Roosevelt and his brother, Kermit Roosevelt, with their friend, C. Suydam Cutting, formed what may be called the first section. They traveled rapidly, covering a long route and devoting themselves mainly to hunting large game and animals of especial rarity. Their Chinese interpreter, Jack Young, was equipped for collecting small mammals, and, although his time for this was quite limited, he "picked up" occasional specimens of interest. This first section, starting from Rangoon, proceeded directly through Burma to Bhamo and thence northward via Tengyueh, Talifu, Likiang, Yungning, Muli, and Chiulung to Tatsienlu. From this well-known place they went to Mouping and then, returning southward through Yachow, they crossed the Tung River and continued just east of the Yalung River through Yehli, Tachow, and Ningyuan and thence very rapidly to railhead at Yunnanfu. From this point, Kermit Roosevelt, in response to urgent demands, returned to the United States while Theodore Roosevelt and C. Suydam Cutting went on to Saigon, Cochin China, to procure specimens of large game, especially seladang, banteng, and water buffalo. A full

account of the trip through Yunnan and Szechwan with illustrations and a detailed map has since been published.[1]

What may be called the second section was conducted by Herbert Stevens, who accompanied the Roosevelts as far as Likiang and subsequently continued alone, making detailed collections along a route somewhat similar to theirs through Yunnan and Szechwan. Mr. Stevens has published a brief account of his itinerary with sketches of peaks and a small map of the region about Tatsienlu.[2] He states: "On March 7 I left Likiang, spending fifty-five days en route in camp and thirty-eight days on the march, via Yungning, Muli, Kopadi, Kulu, Kon La 14,600 feet, Yonka La 15,000 feet, Tiyu 12,900 feet (Gompa), Yatsu 11,200 feet, Baurong 8,000 feet, Patei, Wushi 12,000 feet, Kusata (Gompa), Chentze 13,000 feet, Laila hamlet 12,400 feet, Chaulu 13,600 feet (Gompa), Lai Chu, Zamba Ku 11,600 feet, Trazya 12,100 feet, Haja Tungu 13,000 feet (Gompa), Haja La 15,300 feet, Cheto, to Tatsienlu, where I arrived June 1." Mammals were collected along most of this route and later from a few other localities, mainly Ulongkong, a short distance south of Tatsienlu, and Hlagong, a short distance west. An account of the birds, which are represented by many more localities than the mammals, is soon to be published by Field Museum.

The mammals collected by Stevens number about five hundred, providing a good representation of the general mammal fauna of central Yunnan and western Szechwan. At Wushi, between Baurong and Tatsienlu and east of the Yalung River, he obtained two undescribed subspecies of rodents, a vole (*Eothenomys custos hintoni*) and a pika (*Ochotona cansa stevensi*).

The third section of the expedition devoted itself to concentrated work in northern Indo-China, mainly in the province of Tonkin. Under the leadership of Harold J. Coolidge, Jr.,[3] a party of four was organized in which Russell W. Hendee was the mammalogist, Josselyn Van Tyne[4] ornithologist, and Ralph E. Wheeler physician and parasitologist. After a brief stop in Annam, where collections were made near Quangtri, this party proceeded to Haiphong and Hanoi and thence up the valley of the Riviere Noire. They passed on into northern Laos and worked there from a base at Phong Saly,

[1] Theodore and Kermit Roosevelt, Trailing the Giant Panda, Charles Scribner's Sons, New York, 1929.

[2] Geog. Journ., 75, pp. 353–356, 1930.

[3] Now Assistant Curator of Mammals, Museum of Comparative Zoology, Cambridge, Mass.

[4] Assistant Curator of Birds, Museum of Zoology, University of Michigan.

finally descending the Mekong River with a short stop at Vientiane to Savannaket and thence overland to Huê. The route is shown on the accompanying map (Plate IX, facing p. 191) and in the report on the birds,[1] which has already been published, there is given a complete list and description of all localities visited.

Original plans had contemplated that the Roosevelts in returning from China would join the Indo-Chinese section on the Mekong River, but circumstances prevented and, instead, Mr. Hendee, on May 14, detached himself from the rest of the party in Laos and started down the Mekong, intending to go to Huê and thence around the coast to join Theodore Roosevelt at Saigon. Shortly after leaving, Hendee was attacked by a malignant fever which increased in intensity until he reached Vientiane and was there taken to a hospital in a critical condition on June 3. Three days later, in spite of the best available care, he died, leaving a record as one of the best all-around zoological collectors who ever took the field.

Largely due to Hendee's skill and energy, the Indo-Chinese collection of mammals is one of exceptional variety and interest. Nothing escaped him, and his specimens, as Thomas has said previously of those taken by him in South America, "are a delight to work with."

Another feature contributing materially to the success of the Indo-Chinese section of the expedition was the whole-hearted cooperation of French officials. Grateful acknowledgments are due to P. Jabouille, at that time Administrator of Annam and himself an ornithologist of note, co-author with Jean Delacour of the sumptuous, four-volume work "Les Oiseaux de l'Indochine Française."[2] Jabouille detailed several trained native collectors to accompany the expedition; he opened his own house in Huê to the party; and both officially and personally he rendered invaluable assistance wherever possible.

The choice of Indo-China as a field for concentrated work by one division of the Kelley–Roosevelts Expedition, although a natural one from its geographic position in relation to the other areas visited, was largely influenced by the advice and cooperation of the prominent French ornithologist, Jean Delacour. For some years Delacour has been conducting explorations in French Indo-China and, although his primary interest is in birds, his expeditions in every case have

[1] Bangs and Van Tyne, Field Mus. Nat. Hist., Zool. Ser., 18, No. 3, pp. 33–119, 1931.

[2] Exposition Coloniale Internationale, Paris, 1931.

made important collections of mammals. These mammals were sent mainly to the British Museum where they were studied and described by the late Oldfield Thomas. Just prior to this cooperation with Delacour, the British Museum had, itself, in 1923, sent Herbert Stevens into Tonkin especially to collect mammals. The result was a series of four publications by Thomas from 1925 to 1929 (p. 199) on mammals from French Indo-China in which no less than nineteen supposed new forms were described and knowledge of the fauna, especially that of Tonkin, was enormously enlarged.

In studying the collections of the Kelley–Roosevelts Expedition, it became of the utmost importance to examine the types of the new forms lately named by Thomas and to make comparison with the accumulation of Indo-Chinese mammals in the British Museum, this being the only collection of any size in existence from the region. Through reservation of funds generously provided by William V. Kelley this was made possible, and a large number of selected specimens were taken to London and studied in connection with the unrivaled collection there. The cordial cooperation of the authorities of the British Natural History Museum made this a most pleasant and profitable undertaking. Especial thanks are due and most gratefully rendered to the Director, C. Tate Regan, to the Keeper of Zoology, M. T. Calman, and to the Assistant Keeper of Zoology, M. A. C. Hinton, in charge of the Division of Mammals.

While this work was under way, still another Indo-Chinese collection was received at the British Museum from M. Delacour. This was made in 1929–30, after the return of the Kelley–Roosevelts Expedition, the collecting having been done by Delacour in person with the assistance of the British collector, Willoughby Lowe. The advantages of studying this collection in conjunction with the one already in hand were obvious and its generous submission for that purpose through agreement between Delacour and the British Museum was gratefully accepted. As a result, after brief preliminary examination in London, a large part of this collection was shipped to Field Museum where it has been worked out in detail. Division of the collection leaves a large share of it in the British Museum and in Field Museum, with a considerable number assigned to the Paris Museum, including certain specimens of large size especially taken by Delacour for mounting and exhibition at the French Colonial Exposition of 1931. Types of new forms, seven in number, are in the British Museum.

In size and importance, the collection made by Delacour and Lowe in 1929–30 rivals that of the Kelley–Roosevelts Expedition, but the number of localities represented is much more limited. By far the greater part of it is from the vicinity of Chapa, Tonkin. Continuous work was carried on at this place for two months during November and December, 1929. A large corps of native collectors was organized which brought in material from all the surrounding country, including localities well above Chapa, and others doubtless well below it. Most of the specimens are labeled simply "Chapa," but a considerable number are definitely designated as coming from "Lo Qui Ho," a station high up on the slopes or perhaps at the very summit of Mount Fan Si Pan, which rises behind Chapa to a height variously stated as from 8,000 to 10,000 feet, the altitude of Chapa being 4,300 feet. The exact altitude for individual specimens, therefore, is not certain in all cases. Besides those from the vicinity of Chapa, the collection contains an interesting series of specimens from Hoi Xuan, a locality near the coast in Annam and just below the border of Tonkin in a region having faunal affinity with Tonkin rather than Annam. In addition there are about seventy specimens from various localities, some of them quite far south in Annam and even in Cambodia, collected by the French botanist Poilane and obtained from him by Delacour and Jabouille.

A small but interesting collection made by F. R. Wulsin in 1924 for the United States National Museum has also been examined in conjunction with the other material from the same region. It consists of about fifty specimens, mainly from Lai Chau in northwestern Tonkin and Vientiane on the Mekong River in Laos. For the privilege of reviewing this collection, I am indebted to Gerrit S. Miller, Curator of Mammals.

Finally, a further Indo-Chinese collection of mammals has lately been acquired by Field Museum through cooperation with Delacour. This consists of some 215 specimens, including species not otherwise well represented and providing welcome information as to ranges and relationships. The collection was made by Delacour and assistants during a brief expedition from November 18, 1931, to January 26, 1932. A much more extensive expedition had been intended but circumstances prevented and work was confined to a few localities about the Boloven Plateau in southern Laos. The exact localities, all of which are near latitude 15° N., are described by Delacour, as follows:

Pakse. On the Mekong River. Altitude 300 feet.

Thateng. On the eastern border of the Boloven Plateau, ninety kilometers northeast of Pakse. Altitude 3,000 feet.

Banphone. On the side of the Boloven Plateau, forty kilometers east of Thateng. Altitude 600 feet.

Saravane. Forty-five kilometers northeast of Thateng. Altitude 4,800 feet.

Paleng. Four kilometers northeast of Thateng. Altitude 2,500 feet.

Bassac. On the right (west) bank of the Mekong nearly opposite Pakse. Altitude 300 feet.

Phukong Ntoul. Twenty-five kilometers southwest of Thateng. Altitude 4,800 feet.

Owing to its late arrival just as this report was being completed for the press, the last Delacour collection has not had wholly satisfactory examination mainly because all the skulls were not cleaned and the larger skins not "made up." It has seemed important, however, to list all the specimens and so far as possible to bring knowledge of the region to date.

Although the several collections above mentioned cover by far the larger part of the mammals of Tonkin, Laos, and Annam, and although in studying them it has been necessary to review practically the entire mammal fauna, the time for an exhaustive account of the mammals of Indo-China is still in the future. Such an account preferably should combine field work and museum study. For the present, therefore, I have been content to record mainly the material in hand. In order to bring the work of recent years together, however, the records published in four papers by Thomas have been collated and included so far as possible. Therefore all the expeditions sponsored or participated in by Delacour are covered.

In recording specimens from the different collections, slight abbreviations have been used as follows:

1. K.–R.—Kelley–Roosevelts Expedition, including specimens collected by Theodore Roosevelt, Kermit Roosevelt, C. Suydam Cutting, Herbert Stevens, Jack Young, Harold J. Coolidge, Jr., Russell W. Hendee, Ralph E. Wheeler, Josselyn Van Tyne. Material in Field Museum.

2. D. & L. 1929–30.—Specimens collected by Jean Delacour, P. Jabouille, Willoughby Lowe, and H. Poilane. Material in British Museum, Field Museum and Paris Museum.

3. WULSIN 1924.—Specimens collected by F. R. Wulsin. Material in United States National Museum.

4. DEL. 1931–32.—Specimens collected by Jean Delacour. Material in Field Museum.

5. REC. 1925–29.—Specimens collected by Herbert Stevens, Jean Delacour, Willoughby Lowe. Material in British Museum and Paris Museum. Records published in Proc. Zool. Soc. Lond., 1925, pp. 495–506; 1927, pp. 41–58; 1928, pp. 139–150; 1928 (Jan., 1929), pp. 831–841.

In the lists of specimens, Indo-Chinese localities have their respective provinces indicated by the initial letters, as A. for Annam, L. for Laos, C. for Cambodia, C.C. for Cochin China.

New forms described are as follows:

Pithecus delacouri
Macaca assamensis coolidgei
Triaenops wheeleri
Myotis siligorensis alticraniatus
Discopus denticulus
Neotetracus sinensis fulvescens
Chodsigoa lowei
Belomys pearsoni blandus
Callosciurus erythraeus hendeei
Callosciurus flavimanus bolovensis
Dremomys pyrrhomerus gularis
Tamiops monticolus olivaceus
Typhlomys cinereus chapensis
Rattus indosinicus
Dacnomys millardi ingens
Vandeleuria dumeticola scandens
Eothenomys custos hintoni
Ochotona cansa stevensi
Muntiacus rooseveltorum

Hylobates concolor Harlan. BLACK GIBBON.

Hylobates concolor Harlan, Jour. Acad. Nat. Sci. Phila., 5, part 2, p. 231, pls. 9, 10, 1837—Borneo (sic!); Pocock, Proc. Zool. Soc. Lond., p. 736, 1927—"Hainan or the adjoining mainland of Tonkin, and not from Borneo"; Kloss, Proc. Zool. Soc. Lond., p. 124, 1929—"undoubtedly . . . Hainan."

D. & L. 1929–30.—Chapa, T. 8; Hoi Xuan, A. 1.

Although there have been reports of entirely black gibbons on the mainland of Tonkin, the only specimen previously recorded from there is the one forming the basis of the name *nasutus*, a synonym of *concolor*. This is said to have come from Along Bay, the exact locality being unknown. The present specimens, therefore, provide welcome information as to the exact district in which the typical form is found. Its range is evidently quite limited since the white-cheeked form, *leucogenys*, occurs not far inland and the buff-cheeked one, *gabriellae*, immediately to the southward.

The series from Chapa, which is fairly well inland, includes only two wholly black examples, both apparently males. One of these is a native skin without skull and the other had only preliminary

examination before being withdrawn by Delacour for mounting and exhibit at the French Colonial Exposition. The remainder are young and females in the buff phase quite indistinguishable from *leucogenys*. Their very bright, golden buff color is evidently somewhat different from the silvery gray shown by the female from Hainan described and figured by Pocock (Proc. Zool. Soc. Lond., pp. 169–180, pl. 5, 1905). It is possible, therefore, that they should be regarded as grading toward *leucogenys*.

The specimen from Hoi Xuan, which is much nearer the coast, is jet black throughout and in thick, almost woolly pelage somewhat as described for the original type of the species. The locality is but a short distance from Phuqui where Delacour (Kloss, 1929, p. 125) has reported the white-cheeked form. Collector's measurements of this specimen are: head and body 450; hind foot 150; ear 39. Although it was marked female by the collector, it is probably an adult male.

Hylobates concolor leucogenys Ogilby. WHITE-CHEEKED GIBBON.

Hylobates leucogenys Ogilby, Proc. Zool. Soc. Lond., p. 20, 1840—"Siam."

Hylobates henrici Pousargues, Bull. Mus. Hist. Nat., Paris, p. 367, 1896—Lai Chau, Tonkin.

Hylobates concolor leucogenys Pocock, Proc. Zool. Soc. Lond., pp. 738–739, Sept., 1927; Kloss, Proc. Zool. Soc. Lond., p. 125, April, 1929—suggests Pak Lay, Mekong River, Laos, as type locality.

K.-R.—Lai Chau, T. 2 (ad. ♂, ad. ♀); Lao Fou Tchai, T. 1 (ad. ♀); Muong Moun, T. 1 (im. ♂); Muong Yo, L. 2 (im. ♂).

WULSIN 1924.—Phong Saly, L. 5 (3 ad. ♀, 2 im. ♂).

D. & L. 1929–30.—Savannaket, L. 1 (♂); "Annam," 1; "Laos," 1.

From one of the least-known gibbons, this form now becomes one well represented by specimens of various ages and sexes. It is evidently common in northwestern Tonkin and northern Laos. The papers of Pocock and Kloss have gradually cleared up much of the uncertainty in the classification of this group and it remains for this series, with its topotypes of "*henrici*," to show that name to be an absolute synonym of *leucogenys*.

Adult males of this form are pure black with clear, white cheek-patches. Young males are much the same except that the white may be somewhat dingy and the hairs mostly have dark bases. A young female in the dark phase has light cheek-patches as in the male but they are very faintly tinged with buff and the black of the body shows a slight grayish mixture on the lower back and rump.

Adult females are very handsome animals with long full pelage, colored rich, golden, ochraceous buff, usually paler on the back and richer on the sides and limbs. In the change from the dark to the light phase the black appears to be retained longest on the breast, except of course on the crown, where it is permanent.

The changes in color which take place with growth in these gibbons are still imperfectly understood. A letter recently received from M. Delacour makes the following interesting contribution. "A male *Hylobates concolor* here [Clères, Seine Inferieure, France] since 1926 and about nine years old, suddenly turned gray this year. He is the gray of, say, a silver rabbit, with head, hands, and a point on the back black. Another one in Paris, about six years old, but of the *leucogenys* race, is also alike. I never saw one like them at liberty."

Hylobates concolor gabriellae Thomas. BUFF-CHEEKED GIBBON.

Hylobates gabriellae Thomas, Ann. Mag. Nat. Hist., (8), 4, p. 112, 1909—Langbian, Annam.

Hylobates concolor gabriellae Pocock, Proc. Zool. Soc. Lond., p. 740, 1927; Kloss, ibid., p. 125, 1929.

DEL. 1931–32.—Thateng, L. 2 (♀).

The identity of these females is substantiated by Delacour's statement (in litt.) that a male seen in captivity in Thateng had the yellowish or buffy cheeks characteristic of *gabriellae*.

Pygathrix nemaea Linnaeus. DOUC LANGUR.

Simia nemaeus Linnaeus, Mant. Plant., p. 521, 1771—Cochin China.

Pygathrix nemaeus Elliot, Rev. Primates, 3, p. 98, 1912; Thomas, Proc. Zool. Soc. Lond., p. 127, footnote, 1911.

REC. 1925–29.—Col des Nuages, A. 2; Napé, L. 3.

Although long known, this handsome monkey is seldom seen in collections. It is not represented in the most recent accessions from Indo-China. For the present, the generic separation of this species and its close ally *nigripes* from other langurs as proposed by Thomas may be accepted as a matter of convenience although it is evident that further study is needed.

Pygathrix nigripes Milne-Edwards. BLACK-FOOTED DOUC.

Semnopithecus nigripes Milne-Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, 6, p. 7, 1871—Saigon, Cochin China.

REC. 1925–29.—Djiring, A. 6.

Not represented in the most recent collections. The question of the specific or subspecific relationship between this form and *nemaea* and the status of *Presbytis nemaeus moi* Kloss have been discussed by Thomas (1928) and without further material nothing can be added.

Pithecus germaini Milne-Edwards. GERMAIN'S LANGUR.

Semnopithecus Germani Milne-Edwards, Bull. Soc. Philom., (6), **11**, p. 8, 1876—Cochin China and Cambodia.

Presbytis margarita Elliot, Ann. Mag. Nat. Hist., (8), **4**, p. 271, 1909—Langbian, Annam.

D. & L. 1929–30.—? Lao Bao, A. 4.

REC. 1925–28.—Cochin China, 3.

Four skins without skulls are in the collection obtained by the botanist Poilane. That these came from Lao Bao in central Annam, as stated on the labels, is doubtful. In Lowe's field catalogue, they were originally entered as from Memos, Cambodia, but this was later lined out and overwritten Lao Bao, Annam.

Pocock (Jour. Bomb. Nat. Hist. Soc., **32**, p. 667, 1928) has suggested that this species is only a local representative of the *pyrrhus* series directly connected with *crepusculus* through the supposed form called *margarita*. After examination of the type of *margarita*, I find it difficult to accept this conclusion. This type is slightly grayer and softer-coated than most specimens of *germaini*, but it is essentially the same animal and quite distinct from *crepusculus*. Possibly a very slight subspecies of *germaini* may be differentiated on the Langbian Plateau, but until it is represented by more than the single type specimen of *margarita*, that name is best treated as a synonym.

Pithecus pyrrhus argenteus Kloss. SILVERY LANGUR.

Presbytis argenteus Kloss, Jour. Nat. Hist. Soc. Siam, **3**, pp. 338–340, 1919—Lat Bua Kao, 40 miles west of Korat, east-central Siam.

K.-R.—Muong Mo, T. 1; Muong Yo, L. 4; Namu River between Muong Ngoi and Luang Prabang, L. 1.

D. & L. 1929–30.—Hoi Xuan, A. 3.

DEL. 1931–32.—Banphone, L. 2.

REC. 1925–29.—Phuqui, A. 3; Sambor, C. 3; Xieng Kuang, L. 1.

This is the palest of the *pyrrhus* series, the general color silvery gray with little or no tinge of brownish. It is most similar to *P. p.*

crepusculus of Tenasserim, but the color is paler, near the Smoke Gray of Ridgway. It is a slight form occupying northern and eastern Siam, northern Laos, and adjoining parts of Tonkin. A considerable series from various parts of this region has the common character of paleness as compared with any of the western forms occupying the region from northern Burma to Tenasserim and southwestern Siam.

In his recent study of the group, Pocock (Jour. Bomb. Nat. Hist. Soc., **32**, pp. 667–675, 1928) followed the conservative course of referring several of the pale specimens of this form to *crepusculus*. With considerable additional material, I have reexamined all the specimens of the *pyrrhus* group in the British Museum with the very courteous cooperation of Mr. Pocock, and it now seems that the facts are best represented by the segregation of the northeastern material under a separate name. This apparently should be *argenteus* of Kloss which seems not to have been considered by Pocock.

If regarded as a linear series, running from dark color to light, the group is found to have *barbei* at one extreme and *argenteus* at the other, leaving *phayrei*, *shanicus*, and *crepusculus* as more or less definite stages between the two. Beginning with *barbei* in Upper Burma, we have a form with very dark brown upper parts and whitish, contrasted under parts; next is *phayrei*, as represented by upper Chindwin specimens, which is lighter brown, but still with sharply contrasted under parts; then *shanicus* with under parts less contrasted; then *crepusculus*, which is only slightly less brown than *shanicus* but has less contrasted under parts and lighter tail and legs; finally *argenteus*, grayish throughout including the under parts, which merge insensibly with the upper parts.

The type of *crepusculus* from Mount Mooleyit, Tenasserim, is a distinctly brownish specimen as compared with *argenteus* and is, in fact, only a shade lighter than *shanicus*, although it has a more grayish tail and less contrasted under parts. It stands in a somewhat intermediate position not only between *argenteus* and the brown forms of Burma, but it perhaps also connects with the darker ones (*flavicauda* and *atrior*) of south Tenasserim. The type of *wroughtoni* from "Pachebun" (=Petchaburi), Siam, unquestionably falls with *crepusculus* and, as noted by Pocock, is a "brownish specimen."

The name *argenteus* is unfortunate on account of the earlier *Semnopithecus argentatus* (Horsfield, Cat. Mamm. East India Co., p. 7, 1851). In a descriptive sense, however, it is most appropriate.

Pithecus poliocephalus Trouessart. GRAY-HEADED LANGUR.

Semnopithecus (*Lophopithecus*) *poliocephalus* Trouessart, Ann. Mag. Nat. Hist., (8), 8, pp. 271–272, pl. 7, Aug., 1911—Kai-Chin, northeastern Tonkin.

D. & L. 1929–30.—Cac Ba Island, Bay of Along, T. 6.

REC. 1925–29.—Hanoi Zoological Garden, T. 1.

Among the most valuable specimens obtained by Delacour and Lowe in 1930 are six well-prepared examples of this fine species, heretofore known only from the type in the Paris Museum and one zoological park specimen in the British Museum. They bear out the characters previously noted and figured. As indicated by the skulls, which differ only in minor characters, the species is obviously related only to *P. francoisi*, *P. laotum*, and *P. delacouri*, but it differs from any of these more than they do from each other. Its pelage is slightly coarser, the hairs of the back and sides are much longer, and the tail is not so heavily haired. Hence, while intergradation between the others is perhaps not unlikely, it is probable that *poliocephalus* is fully distinct. It is possible that it is confined to the islands of the Bay of Along, since northeastern Tonkin, from which the type was supposed to come, is in the region inhabited by *francoisi*.

In Lowe's field catalogue, the following note occurs regarding this species. "A curious weak and feeble sort of monkey, feeding on leaves of small bushes. When in danger, it takes refuge in large holes in the limestone hills on which it lives. It is tame, lives in small lots of eight to fifteen, and is very sociable. They are often seen all huddled together on the rocks. Its coloration is decidedly protective, if it has any enemies."

Pithecus francoisi Pousargues. TONKIN LANGUR.

Semnopithecus Francoisi Pousargues, Bull. Mus. Hist. Nat., Paris, p. 319, 1898—Long Tcheou, Kwangsi, China.

REC. 1925–29.—Backan, T. 1; Langson, T. 2; "Tonkin," 1.

Not obtained by the Kelley–Roosevelts or Delacour and Lowe expeditions.

Pithecus laotum Thomas. LAOS LANGUR.

Pithecus laotum Thomas, Ann. Mag. Nat. Hist., (9), 7, p. 181, Feb., 1921—Ba Na Sao, Mekong River, Laos.

Although the Kelley–Roosevelts Expedition passed through the region inhabited by this rare monkey, they failed to secure it.

Pithecus delacouri sp. nov. DELACOUR'S WHITE-BACKED LANGUR (Plate X, facing p. 208).

Type from Hoi Xuan, northeastern Annam. No. 32.4.19.2. British Museum. Adult male. Collected Feb. 15, 1930, by J. Delacour and Willoughby Lowe. Orig. No. 1,878.

Diagnosis.—Allied to *P. francoisi* and *P. laotum*, but differing strikingly from both in having the rump and outer side of the thighs pure creamy white; white markings on head more restricted than in *laotum*, but more extensive than in *francoisi*. Fur soft and thick; mantle not highly developed; tail heavily haired throughout, individual hairs reaching a length of about 50 mm.

Color.—Body, arms, lower legs, and tail shining glossy black; lower back and rump with about two-thirds of the proximal part of the outer sides of the thighs pure creamy white with sharply defined boundaries between it and the adjoining black areas; head mainly black with a white patch behind each ear and a narrow grayish white line from the anterior base of the ear to the angle of the mouth; sides of neck and elongated hairs on cheeks dark sooty grayish; back of neck slightly tinged with brownish.

Skull.—Essentially as in *francoisi* and *laotum*, possibly a trifle larger.

Measurements.—Adult male and female measured by the collector: total length 1,400, 1,410; head and body 580, 570; tail 820, 840; hind foot 183, —; ear 40, 43. Skull of type: basal length 98.4; palatal length 35.4; postorbital constriction 49.3; zygomatic width 87; width of braincase 65; orbital width 69.3; upper toothrow to front of canine 36.8; without canine 28.9.

Remarks.—The discovery of this handsome monkey is one of the conspicuous results of Delacour's expedition of 1930. It is most appropriate, therefore, to have it bear his name.

The species belongs to the restricted group which includes *poliocephalus*, *francoisi*, and *laotum*. These in turn evidently are related to *P. potenziani* of the West Sumatran Mentawi Islands, a very distinct species not heretofore closely associated with any other. Although it differs strikingly in its pure white rump and thighs, *delacouri* seems otherwise to stand somewhat between *francoisi* and *laotum*, both of which are as yet represented in collections by very few specimens. Each stands out at present as well distinguished, but it is not difficult to believe that intergrades between

the three may be found later. In any case it is probable that they are quite local in distribution. *P. poliocephalus* may well be quite distinct, notwithstanding its superficial white on the rump and thighs suggesting that of *delacouri*, for its almost wholly light-colored head and its slender, short-haired tail set it apart.

Similar habits are reported for all these forms, all being somewhat terrestrial and rock-loving despite their long tails.

A convenient key for distinguishing them is as follows:

Rump and thighs pure black.

Head mainly black with a white stripe on lower cheeks and around ear.....*francoisi.*

Head mainly white with a black crest and narrow frontal line.....*laotum.*

Rump and thighs partly or wholly white or buffy.

Entire head and nape light golden buffy.....*poliocephalus.*

Top of head black with white behind ears and on cheeks. *delacouri.*

Pithecus sp.?

Among the mammals collected by F. R. Wulsin for the United States National Museum is a skin with skull of a wholly black langur labeled simply "French Indo-China." It is possible that this may represent still another form of the series including *potenziani*, *laotum*, *francoisi*, etc., but since it has no exact locality and since it is not supported by other specimens from the region, it seems best to leave its specific determination until better material may be available. The black langur of Java (*P. auratus* or *maurus*), which appears to be the only known species described as entirely black, has not been examined in this connection.

Rhinopithecus roxellanae Milne-Edwards. GOLDEN MONKEY.

Semnopithecus Roxellanae Milne-Edwards, Comptes Rendus, Paris, **70**, p. 341, 1870—Mouping, Szechwan, China.

Rhinopithecus roxellanae Milne-Edwards, Rech. Mamm., p. 233, pls. 36, 37, 1870–75; De Winton, Proc. Zool. Soc. Lond., p. 572, pl. 31, 1889.

K.–R.—Mountains near Mouping at altitude 7,500 feet, Szechwan, China, 10.

One fine adult male, various partly grown animals of both sexes, and two very small young, perhaps but a few days old, are in this series. As in the specimen described and figured by De Winton

(l.c.), the adult is more extensively ochraceous on the forehead and cheeks than in the original figure of Milne-Edwards. The hands also are bright-colored, but the color of the back and sides agrees more nearly with the figure of Milne-Edwards than with that of De Winton.

The newly born young, the coloration of which is doubtless undescribed, has thick, soft, and crenulate pelage, with the ears heavily tufted, but there is no indication of the color markings of the adult. Head, body, and legs Light Buff, the hairs of the head and back heavily tipped with deep brown slightly darker than Mummy Brown, the outer sides of the arms heavily and of the legs lightly washed with brownish drab; under parts and inner sides of arms and legs Light Buff without tipping; tail brownish drab, the hairs with light bases in its proximal half.

In partly grown specimens the head remains light-colored with dark-tipped hairs while the back soon acquires hairs with dark bases and broad, light, buffy tips. The rich ochraceous hues do not appear until late, at least not until the second and perhaps not until the third year.

The habits of these monkeys are very little known and about all that can be said is that they inhabit dense mountain forests. Evidence of this is found in the account of the taking of these specimens by Theodore Roosevelt from which the following may be quoted.[1]

"The undergrowth was dense—a tangle of vines and dead wood. The slope was steep. Soon we were in a bamboo jungle where the dust from dried leaves choked us as we gasped for breath. For better than an hour we stumbled upward without seeing a thing. Then we reached a razor-backed ridge down which we threaded our way, peering from side to side through blanket-like foliage.

"It seemed an almost hopeless mission when a native suddenly shrieked with excitement and pointed toward the tree-tops. We could see nothing but started scrambling ahead. Kermit was in front. When my eye caught motion among some branches to the right, I stopped and a second later glimpsed a yellow shape. It was impossible to get a shot with a rest, as the jungle was neck-high, so I whipped up my rifle and fired offhand. I was in luck, for the monkey fell crashing through the branches. It was a splendid dog-ape, with a mane of long, grayish-yellow hair down its back and the

[1]Trailing the Giant Panda, Scribner's, New York, pp. 172–173, 1929.

most brilliant orange on its belly. It was as big as an eight-year-old child. A second later I saw another and brought it down with two shots. Then Kermit started shooting just beyond me, and for a few minutes it sounded like a miniature battle as we fired at half-seen shapes flitting through the tree-tops."

Presbytiscus avunculus Dollman. TONKIN SNUB-NOSED MONKEY.

Rhinopithecus avunculus Dollman, Abstr. Proc. Zool. Soc. Lond., No. 106, p. 18, Mar. 26, 1912; Proc. Zool. Soc. Lond., p. 503, June, 1912—Yen-bay, Songkoi River, Tonkin.

Presbytiscus avunculus Pocock, Proc. Zool. Soc. Lond., p. 300, Mar., 1924.

REC. 1925–29.—Backan, T. 12.

Although Delacour and Lowe obtained a fine series of twelve specimens of this monkey at Backan, Tonkin, in 1925–26 (Thomas, 1928, p. 140), it is not represented in subsequent collections, and is otherwise known only from the type and one immature paratype.

Macaca irus F. Cuvier. CRAB-EATING MACAQUE.

Macacus irus F. Cuvier, Mém. Mus. Hist. Nat., Paris, 4, p. 120, 1818; Cabrera, Ann. Mag. Nat. Hist., (8), 6, p. 620, 1910—Sumatra.

K.–R.—Saigon, C.C. 1.

A single specimen of the usual colōration with grayish feet was obtained at Saigon by Theodore Roosevelt.

Macaca mulatta Zimmermann. RHESUS MACAQUE.

Cercopithecus mulatta Zimmermann, Geog. Gesch. Mensch., 2, p. 195, 1780—based on Pennant's "Tawny Monkey" from India.

Inuus sancti-johannis Swinhoe, Proc. Zool. Soc. Lond., p. 555, 1866—North Lena Island, Hongkong, China.

Pithecus littoralis Elliot, Ann. Mag. Nat. Hist., (8), 4, p. 250, 1909—Kuatun, Fukien, China.

Pithecus brachyurus Elliot, supra cit., p. 251—island of Hainan, China.

Pithecus brevicaudus Elliot, Rev. Primates, 2, p. 216, 1912—substitute for *P. brachyurus*, preoccupied.

Macaca siamica Kloss, Jour. Nat. Hist. Soc. Siam, 2, p. 247, May, 1917—Me Ping rapids below Chiengmai, Siam.

Macaca mulatta Hinton and Wroughton, Jour. Bomb. Nat. Hist. Soc., 27, p. 668, July 31, 1921; G. M. Allen, Am. Mus. Novit., No. 429, pp. 1–3, 1930.

K.–R.—Muong Boum, T. 1; Muong Moun, T. 1; Nam Yu, L. 1.
REC. 1925–29.—Phuqui, A. 4.
WULSIN 1924.—Mekong River, L. 1; Vientiane, L. 2.

DELACOUR'S LANGUR (*Pithecus delacouri* sp. nov.)
Type specimen

Comparison of the above material with specimens from northern India (Nepal and Kumaon) in the British Museum reveals no appreciable differences in color. The type of Elliot's *littoralis* was also examined in this connection with the same result, thus confirming the recent conclusion of Allen (supra cit.) that both *littoralis* and *sancti-johannis* are synonyms of *mulatta*. The same author finds *brevicaudus* Elliot of Hainan indistinguishable and gives little or no encouragement for the recognition of any of the names *tcheliensis*, *lasiotus*, and *vestitus* which, therefore, are much better in synonymy than elsewhere, at least until they can be fully defined on the basis of adequate material. *M. siamica* of northern Siam also belongs in this series and, until distinguishing characters are adduced for it, must be regarded as unrecognizable.[1]

Macaca assamensis coolidgei subsp. nov. COOLIDGE'S MACAQUE.

Type from Hoi Xuan, Annam. No. 32.4.19.1. British Museum. Adult male. Collected Jan. 19, 1930, by J. Delacour and W. Lowe. Orig. No. 1,824.

Diagnosis.—Similar to *M. assamensis*, but tail decidedly shorter and coloration more grayish, especially on the arms and legs.

Color.—General color of body, shoulders, back, and rump Cinnamon Brown, brightest on shoulders and nape, the hairs dark Hair Brown basally and indistinctly annulated Cinnamon Brown and dusky apically; arms, legs and tail decidedly grayish in contrast to body color, the hairs pale Mouse Gray basally and slightly grizzled Hair Brown superficially; under parts and inner sides of arms and legs soiled whitish, the hairs self-colored.

Skull.—Essentially as in *assamensis*, possibly a little larger with slightly heavier dentition.

Measurements.—Type, measured by collectors: total length 805 (888, 900);[2] head and body 575 (560, 580); tail 230 (328, 320); hind foot 173 (168, 168). Adult male from Chapa, Tonkin: total length 815; head and body 600; tail 215; hind foot 167. Skull of type: condylo-basilar length 103; zygomatic width 95.8; width of brain-

[1] Since this was written a revision of the group by Pocock has appeared (Jour. Bomb. Nat. Hist. Soc., 35, pp. 530–551, 1932) in which *brevicaudus* and *siamica* are disposed as synonyms of *mulatta*, *sancti-johannis* is recognized with *littoralis* as synonym, and *tcheliensis* and *lasiotus* are also recognized as slight subspecies of *mulatta*.

[2] Measurements in parentheses are those of two typical *assamensis* from Darjeeling and Sikkim measured by the collector, C. A. Crump.

case 66.5; postorbital constriction 43.2; width across orbits 75.3; condyle to back of molars 54.5; upper toothrow including canine 50.3; molar series 27; basal length of canine 11.7.

Remarks.—The tail in this form is so much shorter than in typical *assamensis* that this character is readily apparent in the comparison of specimens without recourse to exact measurements. The grayish color of the limbs in contrast to the body also is very obvious. In other respects there is every evidence of close relationship to *assamensis* rather than to any other macaque. In fact, a single specimen from Muong Moun in northwestern Tonkin, although doubtless referable to *coolidgei*, may perhaps be regarded as tending slightly toward *assamensis*, the limbs being less grayish and the tail a little longer than in the series from eastern Tonkin.

Such variation as appears in the series of nine specimens from Chapa is away from *assamensis* rather than toward it; that is, it consists in extension of the grayish from the legs to the body rather than vice versa. In one specimen the entire upper parts behind the shoulders are sooty grayish without contrast with the legs. The skull of this specimen is also somewhat peculiar with a narrow basioccipital, small triangular nares, and weak molars; but material is not sufficient to determine what this may signify.

On the label of the type specimen the collector has made the following notation. "Bare skin of body and everywhere beneath fur pale blue, except region around sex organs and lower belly white; face and muzzle dark brown; forehead bluish flesh as low as half way across center of eyes; hands and feet brownish flesh."

Although the specimen selected as type was not collected by him, I have taken the opportunity to name it for Harold J. Coolidge, Jr., who was the leader of the Indo-Chinese section of the Kelley–Roosevelts Expedition and who is especially interested in the Primates.

Specimens examined.—Total 11, from the following localities: Chapa, T. 9 (D. & L.); Hoi Xuan, A. 1 (D. & L.); Muong Moun, T. 1 (K.–R.).

Macaca (Lyssodes) speciosa F. Cuvier. STUMP-TAILED MACAQUE.

Macacus speciosus F. Cuvier, Hist. Nat. Mamm., pl. 47, 1825—no locality.

Pithecus speciosus Elliot, Rev. Primates, 2, pp. 190–193, 1912—"Burma and Cochin China, etc."

Macacus arctoides Geoffroy and various authors.

Macacus harmandi Trouessart, Le Natural., p. 10, 1897—mountains between Cambodia and Siam.

Lyssodes speciosus Pocock, Proc. Zool. Soc. Lond., pp. 1497, 1571, 1926—Burma.

K.-R.—Muong Moun, T. 2.
D. & L. 1929–30.—Chapa, T. 3.
REC. 1925–29.—Col des Nuages, A. 1.

The stump-tailed macaques of Tonkin, especially those from Chapa, are in general less reddish brown than those from northeastern India (Naga Hills) and Tenasserim, but seem best referred to *speciosa*, at least until definite localities are fixed for several names in the group. An adult male from Muong Moun is decidedly browner than examples from Chapa and also differs in having the top and sides of the head distinctly grizzled, but without more material than is at hand as this is written, any attempt at separation is scarcely justified. Comparison also has been made with the type of *Pithecus pullus* Howell, of Fukien, which as shown by G. M. Allen (Am. Mus. Novit., No. 429, pp. 3–4, 1930) is a synonym of *M. s. melli* Matschie. Material in hand differs from this type in less brownish and less uniform coloration, the hairs mostly having some degree of annulation. The distinctions between *speciosa* and *rufescens* Anderson, both so far without definite localities, apparently need clarification. If these should prove to be the same, a form from northern Siam and Tonkin might be recognized under the name *harmandi*.

As to the use of the name *speciosa* instead of *arctoides*, about which there has been some question, I am much inclined to agree with Elliot and Pocock. At the time *speciosa* was published it was by no means unidentifiable from the contemporary standpoint. As the earliest name for one of several forms in a restricted group, it should by all means be applied to one of them. The rejection of such names tends to loose nomenclatural practice in which individual opinion is given rein far beyond what is desirable. Although no code has done so, it would be quite possible to formulate a rule which would cover cases of this kind and contribute to uniformity of usage.

Nycticebus bengalensis cinereus Milne-Edwards. ASHY SLOW LEMUR.

Nycticebus cinereus Milne-Edwards, Nouv. Arch. Mus., Bull., 3, p. 11, pl. 3, 1867—Siam and Cochin China.

Nycticebus cinereus Lyon, Proc. U. S. Nat. Mus., 31, p. 532, 1906—Bangkok, Siam, suggested as type locality.

Nycticebus cinereus Kloss, Jour. Nat. Hist. Soc. Siam, 2, p. 77, 1906; ibid., p. 289, 1917—specimens from Koh Lak, Siam.

Nycticebus coucang cinereus Kloss, supra cit., 3, p. 51, 1918—Wang Pong, Siam.

Nycticebus bengalensis Thomas, Proc. Zool. Soc. Lond., p. 43, 1927.

K.-R.—Vientiane, L. 1.

D. & L. 1929–30.—Near Huê, A. 1; Lao Bao, A. 1.

DEL. 1931–32.—Pakse, L. 1; Thateng, L. 1.

REC. 1925–29.—Xieng Kuang, L. 1.

A fine adult male was obtained by R. E. Wheeler at Vientiane. In this specimen the usual "frosting" on the posterior half of the body has been worn away, leaving this part a bright and nearly clear Russet. This tone is carried with lighter mixture down the hind legs and over the proximal part of the fore legs whence it extends across the under parts, thus pervading the entire animal except on the head, throat, forearms and feet. The same pervading color-tone is seen in the specimen from Xieng Kuang, referred by Thomas to *bengalensis* (1927, p. 43), and also in an incomplete skin in the British Museum from the vicinity of Raheng, Siam, this last from the type region of *cinereus*. In two specimens from the Naga Hills, Assam, representing *bengalensis* (Thomas, Jour. Bomb. Nat. Hist. Soc., 28, p. 433, 1922) the prevailing tone of color is cinnamon rather than russet, which gives the general effect of a much duller-colored animal. Therefore it may be possible to recognize *cinereus* as a subspecies of *bengalensis* occupying Siam and southern Laos. Aside from this slight color difference, there appears to be little or no distinction.

A cotype of *N. cinereus* is in the British Museum, but the skin, having been exposed as a mounted specimen, does not offer color characters except as to distribution of markings. There is evidence of a dark marking at the upper anterior base of the ear and another above the eye, but neither is definitely connected with the median dark line which reaches the occiput. No attempt has been made to determine the relationships of *N. tenasserimensis* Elliot 1913 and *N. incanus* Thomas 1921 (Lower Pegu, Burma), both of which may be subspecies of *bengalensis*.

Nycticebus pygmaeus Bonhote. PIGMY SLOW LEMUR.

Nycticebus pygmaeus Bonhote, Abstr. Proc. Zool. Soc. Lond., 1907, p. 2, Jan. 22, 1907; Proc. Zool. Soc. Lond., pp. 4–5, figs. 1, 2 (skull), pl. 2 (col.), 1907—Nhatrang, Annam.

K.-R.—Lai Chau, T. 1; Phong Saly, L. 1; Saigon, C.C. 1.

D. & L. 1929–30.—Hoi Xuan, A. 1; Lung Lunh, A. 1; Then Loa, A. 1; Thy-ba, A. 1.

DEL. 1931–32.—Thateng, L. 1.

REC. 1925–29.—Huê, A. 1; Kontoum, A. 2; Phuqui, A. 1; Thai Nien, T. 1.

This very distinct species is now shown to range from Cochin China northward through Annam to southern Laos. In most of this region it seems to occupy territory from which the larger *bengalensis* type is excluded, but both have been recorded from Huê, and it is evident that their ranges overlap in Laos. The small size and relatively uniform color are sufficient for ready recognition of the species without recourse to other pronounced characters. However, the statement in the original description that there is "no sign of any dark line down the back" does not hold and, as noted by Thomas, it is probable that the color of the type was somewhat altered by preservative. In recent specimens, especially those in which the superficial "frosting" is worn away, a dark line, Russet to Mars Brown in color, runs from the shoulders to the lumbar region and is well distinguished from the surrounding Tawny. Except for the absence of any indication of this line, the colored figure published with the original description is a good representation of the animal.

Rousettus leschenaulti Desmarest. LESCHENAULT'S FRUIT BAT.

Pteropus leschenaulti Desmarest, Encycl. Meth., Mamm., **1**, p. 110, 1820—Pondicherry, northern India.

REC. 1925–29.—Backan, T. 1.

This bat is known from Nepal to southern China (Amoy). Therefore, the above record, although apparently the only one from Indo-China, has no especial significance.

Pteropus vampyrus malaccensis Andersen. MALACCA FRUIT BAT.

Pteropus vampyrus malaccensis Andersen, Ann. Mag. Nat. Hist., (8), **2**, p. 368, Oct., 1908—Kuala Tembeling, Pahang, Malay Peninsula.

REC. 1925–29.—Huê, A. 2; Phuquoc Island, C. 3.

These are the easternmost records of this typically Malayan bat. It is not represented in the most recent collections.

Cynopterus sphinx Vahl. SPHINX FRUIT BAT.

Vespertilio sphinx Vahl, Skr. Nat. Selsk., **4**, Heft 1, p. 123, 1797—Tranquebar, India.

K.–R.—Muong Mo, T. 11; Phouc Mon, Quangtri, A. 1.

REC. 1925–29.—Huê, A. 2; Kontoum, A. 1; Siem Reap, C. 1; Tay Ninh, C.C. 7.

These include the most northeastern records for the species, which is mainly Indian and East Indian. All the Tonkin specimens are in the dark color phase and average large in size, the forearm being 70 or more. The Phouc Mon specimen is smaller with a forearm of 66.

Megaerops ecaudatus Temminck.

Pachysoma ecaudatum Temminck, Monog. Mamm., 2, p. 94, 1837—Padang, Malay Peninsula.

REC. 1925–29.—Dakto, A. 3.

Although long known, this bat is still very rare and the specimens recorded by Thomas (1927, p. 44) from Annam are not only the first for Indo-China, but are among the very few examples preserved in museums.

Eonycteris spelaea Dobson.

Macroglossus spelaeus Dobson, Proc. As. Soc. Beng., pp. 105–106, May, 1871; Jour. As. Soc. Beng., **40**, p. 261, pl. 10, figs. 3, 4, June, 1871—Farm Caves, Moulmein, Lower Burma.

K.–R.—Pa Ham, south of Lai Chau, T. 6.

DEL. 1931–32.—Thateng, L. 8.

The Tonkin record is the northernmost for the species, the type being from Moulmein and others from Siam and Malaysia.

Rhinolophus lepidus subsp.?

K.–R.—Nguluko, Yunnan 3 (sk.), 8 (alc.).

These bats were taken at the same time and place as those referred to *R. affinis tener* (p. 216) and like them do not seem referable to any species previously recorded from China. Apparently they are closely related to the series which includes *lepidus* (Indian Peninsula), *monticola* (Masuri, Punjab), *refulgens* (Malay Peninsula), and *shortridgei* (Upper Burma). As judged by descriptions, they do not agree exactly with any of these, but for the present it does not seem advisable to add further names, since the material representing those already given is limited and their geographic ranges cannot be determined with any certainty.

The forearm in the present series is unusually long for a bat of such small bodily size. It varies from 42.5 to 45.5 although the skulls are no larger than in bats having a much shorter forearm. The skulls are slightly smaller and have a shorter toothrow than in *lepidus* and *shortridgei*, but they do not especially approach *szechwanus* in which the skull is not only smaller but differs in the shorter palatal bridge. Specimens from Suifu, Szechwan, doubtfully referred by Howell (Proc. U. S. Nat. Mus., **75**, p. 12, 1929) to *szechwanus* are said to have the forearm averaging 41.8 and perhaps may belong to the form under consideration. Measurements of one of the skulls from Nguluko are as follows: condyle to front of canine 14.5; zygomatic width 7.6; mastoid width 8.1; interorbital constriction 2.4; width of nasal swellings 4.2; length of bony palate (palatal bridge) 3; upper toothrow to front of canine 5.8.

Rhinolophus blythi calidus Allen.

Rhinolophus blythi calidus Allen, Am. Mus. Novit., No. 85, p. 1, Aug. 28, 1923—Yenping, Fukien, China.

K.–R.—Muong Moun, T. 1 (sk.).

REC. 1925–29.—Tay Ninh, C.C. 5.

Among the large number of Rhinolophi collected in Tonkin, only one specimen seems referable to the so-called "*pusillus* series." This agrees in color, size, and cranial characters with material from Fukien representing *R. b. calidus*. Specimens from Cochin China referred to *pusillus* (*R. minor* of Andersen, 1905) by Thomas are doubtless closely related if not identical. In 1905, Andersen gave Java, Siam, and Darjeeling as the range of *R. minor* (=*pusillus*), but in 1918, when he named *blythi* and *szechwanus*, he had evidently concluded the mainland forms to be separable. The distinctions are not very clear at present and it might be preferable, at least until suitable material from Java is obtained, to regard all the forms as races of *pusillus*. However this may be, the Tonkin specimen agrees with *calidus*, and that name may be used as proposed by Allen.

Rhinolophus blythi szechwanus Andersen.

Rhinolophus b. szechwanus Andersen, Ann. Mag. Nat. Hist., (9), 2, pp. 376–377, Oct., 1918—Chungking, Szechwan, China.

Herbert Stevens made considerable collections within the range of this form, but failed to obtain it. The opportunity may be taken, however, to record the measurements of the type specimen which were not specifically given with the original description.

These measurements were very carefully taken, transcribed and forwarded by Miss Jane St. Leger to whom grateful acknowledgment is made. They are as follows: head and body 36; tail 18; foot 6; ear 14 (from collector's label). Forearm 38.9; lower leg without foot 16 (from dried skin). Skull: total length occiput to anterior base of canine 15; basion to gnathion 12.3; zygomatic width 7.2; antorbital width 5; interorbital constriction 2.1; width of braincase 7.5; width between canines 1.8; length of bony palate (palatal bridge) 2; width of palate 3; upper toothrow to front of canine 5.6.

Rhinolophus affinis macrurus Andersen.

Rhinolophus affinis macrurus Andersen, Proc. Zool. Soc. Lond., p. 103, 1905—Taho, Karennee, Burma.

K.–R.—Muong Boum, T. 1; Muong Moun, south of Lai Chau, T. 8 (sk.), 3 (alc.).

REC. 1925–29.—Langson, T. 5 (as *R. affinis*).

A topotype of *R. a. macrurus* loaned by the United States National Museum shows detailed agreement with the material from Tonkin. Comparison with specimens in the British Museum representing *himalayanus* indicates only slight average difference in size and the distinction of two forms is rather difficult.

The length of the forearm (51.5–54) serves to distinguish this bat from all the other Rhinolophi of the region except *R. pearsoni*, which has somewhat longer, more "woolly" pelage. A convenient distinction between the skulls is found in the bony palatal bridge which is decidedly longer in *pearsoni* (about 3.8) than in *macrurus* (about 2.3).

Specimens from the island of Hainan representing *R. hainanus* (J. A. Allen, Bull. Am. Mus. Nat. Hist., **22**, p. 482, 1906) seem quite indistinguishable from *macrurus*.

Rhinolophus affinis tener Andersen.

Rhinolophus affinis tener Andersen, Proc. Zool. Soc. Lond., p. 103, pl. 3, fig. 12, 1905—Pegu, Lower Burma.

K.–R.—Nguluko, Yunnan 10 (sk.), 18 (alc.).

Horseshoe bats of the *affinis* type have not been recorded heretofore from China and the considerable distance in latitude and climatic conditions between Yunnan and Lower Burma leads to some doubt that the form called *tener* is quite the one under consideration. The above-mentioned series, however, agrees in most particulars

with the description of *tener* and, in the present state of knowledge, it seems the part of conservatism to add no further names to a group already overburdened. Moreover, the type of *tener* appears to be the only known specimen and it cannot be assumed that others from the same region would not show some variation in dimensions.

The Yunnan specimens disagree with the description of *tener* in having somewhat smaller teeth and longer metacarpals. The forearm also is longer, but with only one specimen of typical *tener* considered, this seems unimportant.

The forearms are nearly or quite as long (51–53.5) as in *R. a. macrurus*, but the skulls are very much smaller and scarcely exceed those of *R. rouxi* to which they show very great general similarity. Relationship to *rouxi*, however, is excluded by the long second phalanx of the third digit and by other characters.

Measurements of a Yunnan specimen compared with those of the type of *tener* (in parentheses) are as follows: forearm 52.8 (50); third metacarpal 38.6 (35.8); first phalanx 16.6 (14.3); second phalanx 25.6 (25); fourth metacarpal 41.1 (37.1); first phalanx 11.6 (10); second phalanx 15.9 (14.3); fifth metacarpal 43 (38); first phalanx 14.3 (11.8); second phalanx 10.7 (13.3); tail 24 (23); lower leg 21.3 (23); foot 10.3 (12). Skull: total length 21 (21.9); width of braincase 9.3 (9); zygomatic width 10.5 (10.5); supraorbital length 5.3 (5.2); width of nasal swellings 5.3 (5.7); upper teeth excluding incisors 7.8 (8.7); lower teeth 8.8 (9.2).

Rhinolophus pearsoni chinensis Andersen.

Rhinolophus Pearsoni chinensis Andersen, Ann. Mag. Nat. Hist., (7), **16**, p. 289, Sept., 1905—Kuatun, Fukien, China.

K.–R.—Chapa, T. 2; Muong Mo, T. 1; Muong Moun, T. 1.

D. & L. 1929–30.—Chapa, T. 1 (alc.).

Since they agree in having a short tibia (25.5–26.5), these bats are doubtless best referred to *chinensis*, although in other characters they differ but little or not at all from typical *pearsoni*. The status of *R. yunnanensis* from Hotha, Yunnan, is still uncertain and specimens from that region, as well as series from Fukien, would be welcome. The name *chinensis* was based on a single specimen and, later, one other from southern Burma was referred to it by Andersen (Ann. Mus. Civ. Stor. Nat. Gen., (3), **3**, p. 477, Oct., 1907).

Rhinolophus subbadius Blyth.

Rhinolophus subbadius Blyth, Jour. As. Soc. Beng., **13**, part 1, No. 150, p. 486, 1844—Nepal.

K.–R.—Muong Moun, T. 3 (sk.), 2 (alc.).

These appear to include the only extant modern skins and skulls of this rare bat, smallest member of the genus *Rhinolophus*. The type, from Nepal, is reputed to be in the Indian Museum at Calcutta, but has had no recent examination. The type of *R. garoensis* from the Garo Hills is also in the same museum. In 1905 (Proc. Zool. Soc. Lond., p. 129, 1905) Andersen placed *garoensis* as a synonym of *subbadius*, apparently with good reason, but in 1918, without explanation, he dropped *subbadius* and used only *garoensis*. Evidence for this change may have been published, but it has not come to my notice, and I continue to use *subbadius*.

The specimens in hand are rather bright-colored, the hairs with light bases and cinnamon tips. The under parts are paler anteriorly and more like the back posteriorly and laterally. Measurements of a specimen taken by R. E. Wheeler are: total length 46; tail 11; hind foot 7. The forearm in the dry skin measures 32.7; lower leg 13; ear from meatus 10.2; width of tragus 4. Measurements of the skull are as follows: length to canine 14.4; mastoid width 6.6; width of braincase 6.4; zygomatic width 6.7; width of nasal swelling 3.9; mandible 9; upper teeth 5.5. These measurements indicate an animal even smaller than that described as *subbadius* and *garoensis*. A single skin without skull from southern Yunnan (near Mongtze?) in the British Museum agrees with our specimens in size and color and doubtless belongs to the same species.

Rhinolophus malayanus Bonhote.

Rhinolophus malayanus Bonhote, Fasciculi Malayenses, Zool., 1, p. 15 (author's ed.), July, 1903—Biserat, Jalor, Malay States.

K.–R.—Muong Moun, T. 13 (sk.), 1 (alc.).

Specimens of the species represented by this series failed to be included among those taken to London for direct comparison with Andersen's material. Their identification as *malayanus*, therefore, is provisional. Among the other Rhinolophi of the collection, they are marked by the great contrast in the color of the upper and under parts. In nearly all examples there is a well-marked light area on the breast in which the hairs are wholly dull whitish without any dark tipping. There is also a tendency to the formation of a whitish area in the interorbital region just behind the lancet, and the hairy front margin of the ears is whitish. The forearms measure 40–42. The skulls are slender, with narrow braincases, short palates and rather well-developed nasal swellings.

Rhinolophus sp.

K.–R.—Muong Mo, T. 3 (sk.); Muong Moun, T. 1 (sk.), 2 (alc.).

These bats evidently belong in the series which Andersen has indicated as related to *R. borneensis* and *R. malayanus*. They differ from *malayanus* (antea) in larger size, darker color, and more slender skulls. The forearms measure 42.5–45.8 and the total length of the skull averages about 19.5, with a width of braincase of 8.5. The color is dark cinnamon brown above and below, the light bases of the hairs almost wholly concealed.

The great development of the nasal swellings shown in *R. stheno* is somewhat less in *malayanus* and in the present series perhaps still less, but in general robustness of the skull these specimens agree with *stheno* somewhat better than with *malayanus*. Since a form more nearly agreeing with *malayanus* is also found at the same locality in Tonkin, it is possible that the present one is a northern representative of the larger Malayan form *stheno*, the inflated nasals of the latter being a local rather than a general character. Until the incompleted work of Andersen on the entire genus is fully reviewed, however, conclusions of this sort can be regarded as little more than suggestive and the addition of further names is not desirable.

Rhinolophus episcopus caldwelli Allen.

Rhinolophus episcopus caldwelli G. M. Allen, Am. Mus. Novit., No. 85, p. 3, Aug. 28, 1923—Yuki, Fukien, China.

K.–R.—Muong Moun, T. 1 (sk.).

D. & L. 1929–30.—Chapa, T. 3 (alc.).

Although slightly larger than the heretofore unique type of this form, these specimens may be referred to it with considerable confidence. The single skin agrees with the type of *caldwelli* in being brighter-colored than *episcopus* and in having the breast and throat dull whitish without dark-tipped hairs. The forearms measure 43.3, 43.7, 44, 45.3 against 43 in the type of *caldwelli* and 47.5 in *episcopus*. The skulls indicate but little difference in size between the two forms, but the teeth appear to average slightly smaller in *caldwelli*. The species is readily distinguishable from all its congeners of the region except *macrotis* by the long palate and anteriorly narrowed skull.

Rhinolophus macrotis siamensis Gyldenstolpe.

Rhinolophus macrotis siamensis Gyldenstolpe, Kungl. Svenska Vetensk. Handl., 57, No. 2, Mamm. II, p. 12, 1916—Doi Par Sakeng, northwestern Siam.

K.–R.—Muong Moun, T. 2 (sk.).

Two specimens of horseshoe bats in the collection may be assigned to *R. m. siamensis*, although their measurements definitely exceed those given for the unique type of that form. Comparison with published measurements indicates that they are almost exactly intermediate between *macrotis* and *siamensis*. The forearms are 38, 39, against 41–43 for *macrotis* and 36.1 for *siamensis*. The upper toothrows are 5.7, 5.8, against 6.3 for *macrotis* and 5.3 for *siamensis*. The species appears to be rare or difficult to obtain and the total number of specimens recorded of all forms is quite small, so the extent of variation in size is but imperfectly known. It seems plain, however, that an eastern form may be differentiated which averages smaller than *macrotis* of the northwestern Himalayas and, at least until much more material is available, the name *siamensis* may best be used for it.

The specimens above recorded fulfill the prediction made by Andersen in 1907 (Ann. Mus. Civ. Stor. Nat. Gen., (3), **3**, p. 27) when in describing *R. m. dohrni* from Sumatra he said: "*Rh. macrotis* was hitherto only known from the Himalayas (Masuri, Nepal). It is therefore of much interest now to see the range of this species extended to Sumatra. After this there can, of course, be no doubt that it will also be found in Indo-China and the Malay Peninsula."

Hipposideros larvatus Horsfield.

Rhinolophus larvatus Horsfield, Zool. Res. in Java, unpaged, 1824—Java.

K.–R.—Muong Boum, T. 12 (sk.), 2 (alc.); Muong Moun, T. 16 (sk.).

These agree with specimens from Tenasserim and Upper Burma referred to this species by Wroughton (Jour. Bomb. Nat. Hist. Soc., **23**, p. 704, May, 1915). They also agree in color with specimens from Java, the type locality, but are slightly larger, with forearms 56–58 instead of 54–56, and their skulls are a little larger. Hence it is not improbable that a northern form might be differentiated, but what name it should bear is uncertain.

Two color phases and various gradations between them are represented in the very fine series of skins collected by Hendee and Van Tyne. In one the terminal color of the hairs is Cinnamon Brown and in the other it is blackish Mummy Brown.

Hipposideros gentilis Andersen.

Hipposideros gentilis Andersen, Ann. Mag. Nat. Hist., (9), **2**, pp. 380–381, Oct., 1918—Thayetmyo, Burma.

OWSTON'S CIVET (*Chrotogale owstoni* Thomas)
From a painting by Walter A. Weber

K.-R.—Muong Mo, T. 6 (sk.); Muong Moun, T. 9 (sk.), 1 (alc.).
D. & L. 1929–30.—Hoi Xuan, A. 4 (alc.).

These agree fairly well with the type and others in the British Museum doubtless identified by the original describer. Externally they are scarcely distinguishable from the Indian *R. fulvus*, but the relative size of the small first lower premolar serves to place them. The forearms range in length from 38 to 42 and the skull length (canine to condyle) from 15.2 to 15.5. These measurements are almost exactly those given for typical *gentilis*, although the forearm comes within the range (40–43) given *H. g. sinensis* from Fukien. At most, this form can differ from *gentilis* only in slightly greater average size and its recognition seems scarcely justified by the small amount of material now available.

Hipposideros cineraceus Blyth.

Hipposideros cineraceus Blyth, Jour. As. Soc. Beng., 22, p. 410, 1854—Punjab, India.

K.-R.—Lai Chau, T. 1 (sk.); Muong Moun, T. 3 (sk.); Phong Tho, T. 1 (sk.).

Apparently this is the smallest species of *Hipposideros*. The average length of the forearm in these five specimens is 33.8 (32.8–34.8). They were overlooked when material was selected for comparison in the British Museum, but their dimensions seem to leave little room for doubt as to their identity.

Hipposideros diadema masoni Dobson.

Phyllorhina Masoni Dobson, Jour. As. Soc. Beng., 41, p. 338, 1872—Moulmein, Tenasserim.

Hipposideros diadema masoni Andersen, Ann. Mus. Civ. Stor. Nat. Gen., (3), 3, p. 6, 1907.

D. & L. 1929–30.—Lao Bao, A. 1.

Until recently, the restricted *diadema* group has been recorded chiefly from insular localities, the only mainland form *masoni* being known from three specimens only from Tenasserim and Johore (Andersen, l.c.). A record from Annam, therefore, constitutes a considerable extension of the range of the group. The specimen, collected by the botanist Poilane, is in rather poor condition, mummified after temporary immersion in preservative. The skull is closely similar to that of one from Java, but the rostral prominences are slightly more swollen.

Hipposideros armiger Hodgson.

Rhinolophus armiger Hodgson, Jour. As. Soc. Beng., 4, p. 699, 1835—central Nepal.

K.-R.—Muong Boum, T. 15 (sk.), 2 (alc.).
REC. 1925–29.—Backan, T. 1; Ngai Tio, T. 1.
D. & L. 1929–30.—Chapa, T. 2 (sk.), 78 (alc.).

The color in this series agrees quite closely with that of specimens from central China rather than with those from Fukien which Allen (Am. Mus. Novit., No. 85, p. 4, 1923) has given separate recognition as *H. a. swinhoei.* There is considerable variation, however, and dichromatism seems to be indicated.

Hipposideros pratti Thomas.

Hipposideros pratti Thomas, Ann. Mag. Nat. Hist., (6), 7, p. 527, 1891—Kiating, Szechwan, China.

D. & L. 1929–30.—Chapa, T. 36 (alc.), 2 (sk.).

Although not taken by previous collectors in the same region, this bat was found in numbers by Delacour and Lowe in 1930. The series includes both adult males and females as well as younger examples and serves to clear up uncertainties in regard to sexual differences which have been standing since the species was originally described from a single female some forty years ago.

In recent years the only important notes on the species are those of Howell (Proc. U. S. Nat. Mus., 75, p. 13, 1929), who records thirty specimens mainly from Hunan and Fukien, China. He is able to add considerable data as to color, size, and detailed distinctions from *H. armiger*, but his material included only one male and that apparently not fully mature.

The adult males of the present series have enormous, wing-like, fleshy expansions on either side of the frontal sac, indicating a sexual difference far greater than has been suspected (fig. 29). These expansions reach a combined width of 28 mm. and when erected their points stand some 23 mm. above the nostrils. The V-shaped indention, at the bottom of which is the frontal sac, has a length on each side of 8 mm.

In the adult females the expansions are similar in form but very much smaller, more densely hairy, and relatively inconspicuous. Their combined width is about 14 mm. and the height above the nostrils 13 mm. Some of the males examined have the expansions no larger than in the females and, although the alcoholic specimens

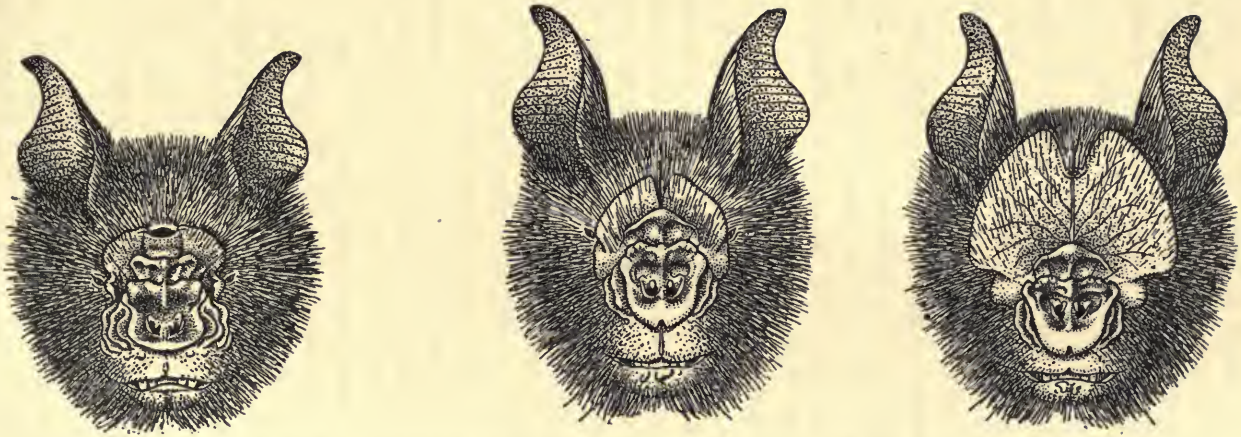

FIG. 29. Nose leaves of *Hipposideros armiger*, male (left) and *Hipposideros pratti*, male (right) and female (center). Natural size.

do not show especial signs of immaturity, they are perhaps to be regarded as young enough to be undeveloped. The few males heretofore recorded evidently have been of this character. That the extreme development is seasonal may also be possible. Somewhat similar sexual differences have been observed and figured in *H. armiger* (Dobson, Monog. As. Chirop., p. 64, figs. a–b, 1876) and other species of *Hipposideros*, but the degree of divergence shown by *H. pratti* is far beyond any of these. In fact it may be said that the development of facial dermal appendages in this species exceeds that of any other member of the Chiroptera.

The principal cranial characters distinguishing *pratti* from *armiger* are obviously related to the enlargement of the external dermal growths. These are the widened nares and the broad, depressed and concave rostrum with the consequent alteration of the entire dorsal outline of the skull.

As noted by Andersen (Ann. Mag. Nat. Hist., (7), **17**, p. 35, footnote, 1906), *H. pratti* is perhaps related to *H. leptophylla*, a species from the Khasi Hills, Assam, India, with skull unknown, but described as having the front border of the horseshoe notched as in *pratti* and in general similar except that the animal is smaller in size. Another obviously close relative is *H. lylei* (Thomas, Ann. Mag. Nat. Hist., (8), **12**, p. 88, 1913), also described as smaller than *pratti*. The type locality of *lylei* is the vicinity of Chiengmai, northern Siam, which is relatively near the region from which the present series comes. Its forearm is given as 78, which is somewhat shorter than in the smallest (82.3) specimens in our series. Further specimens have been referred to *lylei* from the Shan States, Burma (Ryley, Jour. Bomb. Nat. Hist. Soc., **22**, p. 715, 1914), but although it is intimated that specimens larger than the type may have been included, no measurements are given. Published comparisons of *lylei* and *pratti*, therefore, are confined to those of the respective type specimens, neither of which I have examined. Average measurements of forearms in the series from Tonkin are as follows: ten adult males 86.3 (85.2–87.8); ten young males 85.9 (83.7–89.5); ten adult females 85.2 (82.3–88.4). These are slightly less than the average of 88.5 obtained by Howell for fourteen specimens from southern China.

Triaenops wheeleri sp. nov. WHEELER'S TRIDENT BAT.

Type from Muong Moun, Tonkin. No. 32,236 Field Museum of Natural History. Adult female. Collected March 21, 1929, by R. E. Wheeler. Orig. No. 80.

Diagnosis.—Size small (forearm 42), much smaller than *T. persicus* and not quite equaling the dimensions given for *T. furcula* of Madagascar. Somewhat similar to *T. tricuspidatus* of the Solomon Islands, having the same exserted tail-tip, the same small ears, and very nearly the same nasal appendages, but differing in color and in having a more depressed rostrum and less inflated nasal region. Zygoma with a posterior vertical expansion well developed, but not equaling that of *T. persicus;* upper canines with anterior secondary cusps slightly higher than the posterior ones, thus differing from *T. persicus* in which the reverse condition occurs.

Color.—Upper parts brownish (Bister) or sooty (probably representing two color phases), the hairs broadly white basally; under parts pale Snuff Brown, the hairs slightly lighter basally than terminally.

Membranes and appendages.—Wings and tail about as in *Hipposideros;* wings and interfemoral membrane from middle of metatarsus above base of toes; terminal phalanges of fourth and fifth fingers definitely bifurcate; foot with a narrow, well-differentiated sole; tail with its tip slightly exserted beyond interfemoral membrane. Ears short and when laid forward barely reaching to the nostrils; outer border of ear excavated in upper half and expanded in lower. Nose leaves double, at least laterally; a thickened heart-shaped area behind the nostrils thinly beset with stiff hairs and behind this an erect semilunate process rising from a thin membranous base and divided into three slightly rugose parts, a median subcylindrical one in the center and a subtriangular one on each side, the upper border thus having a tridentate appearance with the median point slightly higher than the lateral ones.

Skull.—General shape of skull much as in *Hipposideros;* rostrum depressed below level of braincase; zygomata somewhat converging anteriorly; an upright plate from the posterior half of the zygoma in general similar to that in *T. persicus* but its base occupying a smaller proportion of the zygoma; nasal region more inflated than in *Hipposideros* but less than in *T. persicus* and *T. tricuspidatus;* basioccipital relatively wide, much as in *Hipposideros;* upper incisors indistinctly bifid; upper canines with short anterior and posterior secondary cusps, the anterior slightly higher than the posterior.

Measurements.—Average of six adults: total length 84; tail 39; hind foot 8; forearm (dry) 41.6. Adult in alcohol: forearm 42; second finger, metacarpal 32; third finger, metacarpal 31.5; first

phalanx 15; second phalanx 21; fourth finger, metacarpal 31; first phalanx 12; second phalanx 7.5; fifth finger, metacarpal 28; first phalanx 12.5; second phalanx 10; tibia 18; hind foot 9; calcar 10. Skull of type: greatest length 15; condyle to front of canine 13; zygomatic width 7.4; mastoid width 7.1; interorbital constriction 2; width across nasal swellings 4.4; height of zygomatic plate 2; upper toothrow to front of canine 5.2.

Remarks.—The reference of this species to the genus *Triaenops* is somewhat provisional. *T. tricuspidatus,* heretofore regarded as a *Hipposideros,* may be placed in *Triaenops* with some confidence, but the present species, although obviously departing from typical *Hipposideros* in the same direction, appears not to have progressed so far. The general shape of its skull is not far from that of *Hipposideros,* but in external characters it agrees with *Triaenops* and strongly approaches it in the character of the zygomatic plate and in the secondary cusps of the upper canines. Direct comparison has only been possible with *T. persicus* and *T. tricuspidatus,* since specimens of this genus are very rare in collections. The two small species (*aurita* and *furcula*) described from Madagascar approximate the size of *wheeleri,* but it is not improbable that it will prove less related to these than to *tricuspidatus.*

Among Indo-Chinese bats thus far known, it is easily recognized by its small ears, its tridentate nasal appendage, and its well-marked expansion of the zygoma.

Six skins with skulls and two in alcohol were obtained at Muong Moun, Tonkin, by the Kelley–Roosevelts Expedition. A single skin without skull and forty-six alcoholics were taken in the vicinity of Chapa, Tonkin, by Delacour and Lowe in 1930.

Coelops frithii inflata Miller.

Coelops inflata Miller, Proc. Biol. Soc. Wash., **41**, p. 85, Mar. 16, 1928—Yenping, Fukien, China.

K.–R.—Muong Moun, T. 4 (2 sk., 1 alc., 1 skull).
D. & L. 1929–30.—Hoi Xuan, A. 1 (alc.).

Bats of the genus *Coelops* are quite rare in collections and nearly all the known specimens have been examined in identifying the present small series. In the British Museum there were accessible two skins from Java representing *bernsteini;* one skin from Cherrapunyi, Assam, provisionally regarded as *frithii;* one skull from Lakhun, Laos; and the type of *robinsoni* from Pahang, Malay

Peninsula. Through the kindness of G. S. Miller, Jr., and G. M. Allen, the types of *inflata* and *sinicus* also have been available.

It is difficult to believe that the five names above mentioned represent as many separate and distinct species, but with scarcely more than one specimen for each name, and with each specimen showing some peculiarity, conclusions are difficult. In such cases it is customary to use binomials until material is more abundant in spite of great probability that complete gradation from one form to another will be found and that some of the characters of single specimens will not be maintained in series. The facts are that in *Coelops* the dependable characters shown by the various named forms are of a kind usually found to be subspecific and evidence that any two forms occupy the same territory is lacking. With the possible exception of *sinicus*, which is of different color and much larger than the others, all the names might profitably be brought together as subspecies of *frithii*.

The Indo-Chinese specimens agree fairly well with the type of *inflata*, but do not show quite the same degree of enlargement of the braincase. They may thus be tending toward *robinsoni*, although they still exceed that form quite decidedly. The space between the outer lower incisor and the canine, which Miller has mentioned as a generic distinction, proves to be variable. In *sinicus*, these teeth are actually in contact. In one specimen from Tonkin, the space is slight, scarcely more than the width of one of the dentations of the incisor, while in others from the same locality it is nearly or quite equal to the full width of the incisor.

Javanese specimens of *C. f. bernsteini* seem indistinguishable externally from *frithii* as represented by the specimen from Assam. The skulls also are very similar, that of *frithii* differing mainly in somewhat broader, heavier teeth. The skull from Lakhun, Laos, is a little larger than specimens of *inflata* from Tonkin but agrees with them in having the teeth narrower than in *frithii* and *bernsteini*. Therefore, it is perhaps to be regarded as somewhat connectant.

C. f. robinsoni is quite the smallest form yet discovered. Measurements of the skull of its type, which were not published by the original describer, are given in the following series which includes consecutively (1) type of *robinsoni*, (2) type of *inflata*, (3) *bernsteini* from Java, (4) type of *sinicus*. Greatest length 14.5, 15.1, 16.5, 17.1; zygomatic width 6.4, 6.8, 7.3, 7.8; width of braincase 6.7, 7.5, 7.6, 8.1; rostral width 3.4, 3.6, 4.1, 4.2; upper toothrow 4.7, 5.2, 5.7, 6.3. These measurements show a graded progression in size from the

smallest form *robinsoni* to the largest one *sinicus*, and when more specimens become available from intermediate localities, complete inosculation may well be expected.

The genus *Coelops* has numerous dental characters distinguishing it from *Hipposideros*. Among them one which seems not to have been mentioned by previous writers is the existence of an anterior third cusp on the upper canine. In *sinicus* this is not well defined, but in the other forms it is quite prominent, giving the tooth the appearance of a primitive premolariform condition.

Taphozous melanopogon Temminck.

Taphozous melanopogon Temminck, Monog. Mamm., 2, p. 287, pl. 60, figs. 8, 9, 1835–41—Java.

K.–R.—Pak Hou, L. 5 (sk.).

Specimens of typical *melanopogon* from Java have not been available for comparison. The length of the forearm in these northern examples is 65–67 which is not unusual in series from India and Burma but is perhaps somewhat longer than will be found in East Indian material.

Murina cyclotis Dobson.

Murina cyclotis Dobson, Proc. As. Soc. Beng., p. 210, 1872; Jour. As. Soc. Beng., p. 206, pl. 14, part II, 1873.

K.–R.—Muong Moun, T. 1 (sk.); Phong Saly, L. 3 (sk.).

These agree with Indian specimens from the Chin Hills referred to this species by Wroughton. The type locality is said to be "unknown" and the type in the Indian Museum (No. 166a) appears to have had no recent examination. The species has been recorded from the island of Hainan by J. A. Allen (Bull. Am. Mus. Nat. Hist., **22**, p. 487, 1906).

Murina tubinaris Scully.

Harpiocephalus tubinaris Scully, Proc. Zool. Soc. Lond., p. 200, 1881—Gilgit, Kashmir.

K.–R.—Muong Boum, T. 1 (sk.); Muong Mo, T. 2 (sk.); Phong Saly, L. 5 (sk.), 1 (alc.).

These appear to be the first records of this species for localities outside of India. Comparison with specimens from Darjeeling shows no important differences.

Pachyotus kuhli Leach.

Scotophilus kuhlii Leach, Trans. Linn. Soc. Lond., 13, p. 71, 1822—no locality.

K.–R.—Phong Tho, T. 1 (sk.); Phouc Mon, Quangtri, A. 8 (sk.), 1 (alc.).

REC. 1925–29.—Backan, T. 3.

These are equal in size to large examples from India and Burma, but do not reach the dimensions recorded for *P. k. insularis* of the island of Hainan. Forearms measure 60.8, 61, 61.5, 63, 63.5, 63.5, 64.3. Most of the specimens are rich Hazel in color both above and below, but several are dull olivaceous above and bright, nearly Yellow Ocher below.

Pachyotus castaneus Horsfield.

Nycticejus castaneus Horsfield, Cat. Mamm. E. Ind. Mus., p. 38, 1851—Malacca.

K.–R.—Quangtri, Phouc Mon, A. 3 (sk.).

REC. 1925–29.—Quang Ngai, A. 1.

Comparison of these has been made with specimens from Tenasserim and southern Siam from which they do not appear to differ in any important way. Specimens of *Scotophilus gairdneri* Kloss (Jour. Nat. Hist. Soc. Siam, **2**, p. 284, 1917) from central Siam have not been available. *Scotophilus castaneus consobrinus* Allen (Bull. Am. Mus. Nat. Hist., **22**, p. 485, 1906) from Hainan also seems very closely allied.

Nyctalus noctula sinensis Peters. CHINESE NOCTULE BAT.

Vesperus sinensis Peters, Monatsb. Akad. Wiss., Berlin, (1880), p. 258, 1881—Peking, Chihli, China.

Nyctalus noctula sinensis A. B. Howell, Proc. U. S. Nat. Mus., **75**, p. 18, 1929.

K.–R.—Suifu, Szechwan 5 (alc.); Yachow, Szechwan 1 (alc.).

The Asiatic noctule bats closely allied to *N. noctula* of Europe have received several names and material representing them is scattered among various museums. Until these can be brought together for a general study, therefore, the identification of individual specimens is difficult. Apparently most of the eastern forms are smaller and have a greater extension of hair on the membranes, especially the interfemoral, than the European noctule, so this may distinguish them collectively; but characters of color and pro-

portions have not been thoroughly worked out and the status of any particular name is doubtful.

The present specimens are quite dark in color and agree in general with the form called *velutinus* by G. M. Allen (Am. Mus. Novit., No. 85, p. 7, Aug. 28, 1923). The only difference deducible from the description is in the length of the second phalanx of the third finger which is given as 21.5 mm. for *velutinus*, whereas in our specimens it measures only 14 mm. The forearm in five specimens from Szechwan varies from 49.5 to 52. Specimens of *N. n. labiatus* of Nepal have not been available for comparison, so it seems best to follow Howell and refer Szechwan examples to *sinensis*. *Nyctalus n. namayei* Kuroda (Annot. Zool. Japon., **9**, part V, p. 601, 1920) appears not to have been compared with *sinensis*, but the published measurements (forearm 45–48) indicate it to be a form of relatively small size.

Miniopterus schreibersi parvipes Allen.

Miniopterus schreibersi parvipes Allen, Am. Mus. Novit., No. 85, p. 7, Aug. 28, 1923—Yenping, Fukien, China.

REC. 1925–29.—Ngai Tio, T. 7.

Specimens taken by Herbert Stevens and recorded by Thomas as "one of the dark eastern forms of this widely spread bat" are the only ones contained in any of the collections reviewed. Allen's name *parvipes* may be provisionally assigned to them although distinction from the Indian *fuliginosus* has not been fully demonstrated. Their relationship to Temminck's *blepotis* of Java is still to be considered.

Kerivoula papillosa Temminck.

Vespertilio papillosus Temminck, Monog. Mamm., **2**, p. 220, pl. 55, figs. 1–4, 1835–41—Java.

K.-R.—Muong Mo, T. 1 (sk.).

A bat of the genus *Kerivoula* is provisionally referred to *K. papillosa*. In external measurements (forearm 40.7), it agrees with the form described from Calcutta as *lenis* (Thomas, Jour. Bomb. Nat. Hist. Soc., **24**, p. 417, 1916), but the skull and teeth are larger, about as given for typical *papillosa*.

Kerivoula depressa Miller.

Kerivoula depressa Miller, Proc. Biol. Soc. Wash., **19**, p. 64, 1906—Biapo, northeast of Tounghoo, southern Burma.

K.-R.—Muong Mo, T. 1 (sk.).

A single *Kerivoula,* taken at the same locality with *K. papillosa,* is probably allied to *K. depressa.* It shows a similar broadening of the braincase, but its skull is considerably larger than in the type of *depressa* which has been loaned by the United States National Museum. In external size and appearance it agrees with *depressa* and may be referred to that form, at least provisionally, since its separation would scarcely be justified without examination of a larger number of specimens.

Kerivoula sp.

K.-R.—Phong Saly, L. 1 (alc.).

An alcoholic specimen of a plain-colored *Kerivoula* is in rather poor condition and cannot be satisfactorily diagnosed. The forearm is 39, which might indicate affinity to *K. papillosa,* but the lower leg and foot (injured) scarcely reach 24, which is too short for that species.

Myotis (Leuconoe) longipes Dobson.

Vespertilio longipes Dobson, Proc. As. Soc. Beng., p. 110, 1873—Bhima Devi, Kashmir.

Vespertilio megalopus Dobson, Ann. Mag. Nat. Hist., (4), **16**, p. 261, 1875—Africa [sic].

Leuconoe longipes Thomas, Jour. Bomb. Nat. Hist. Soc., **23**, pp. 610, 612, May, 1915.

K.-R.—Muong Moun, T. 1 (sk.).

The skull of this bat has been compared with that of a cotype of *longipes* and that of the actual type of *megalopus* in both of which the skulls are perfect. The three agree so closely that not even the slightest distinction can be drawn among them. Although Thomas states (l.c., p. 610) that the occurrence of *M. daubentoni* in India is "extremely doubtful," I am much inclined to the belief that this bat is more closely related to that species than to any other. It is rare in India and apparently is now represented in the British Museum only by the two specimens above mentioned. Externally it is similar to specimens from the Kurile Islands referred to *daubentoni* and also to *macrodactylus* from Japan. In these the skull is slightly larger, with a somewhat larger braincase. In the Tonkin specimen the color is paler than in the more northern skins, and the pale color of the under parts is extended to the base of the ears and on the side of the neck.

I am unable to see generic significance in the larger feet of the species embraced under the name *Leuconoe*. For the sake of that "convenience" which seems to apply mainly to the arrangement of specimens in museum cabinets a subgeneric term may be desirable.

Myotis muricola Gray.

Vespertilio muricola Hodgson, Calc. Jour. Nat. Hist., 2, p. 212, 1841—nomen nudum; Gray, Cat. Mamm. & Birds Nepal & Thibet, p. 4, 1846—central Nepal.

K.-R.—Phong Saly, L. 6 (sk.).

The name *muricola* may be used in the "blanket" sense for these specimens. Direct comparison with typical *muricola* has not been possible, but descriptions indicate agreement in all except details which are not likely to prove of more than subspecific significance. *M. fimbriatus* (Peters, Proc. Zool. Soc. Lond., p. 617, 1870), which has a forearm of about the same length (38–39) as *muricola*, is a bat of quite different color and has a heavier skull with a high braincase and the anterior premolars are wholly in the toothrow. Specimens from Yenpingfu, Fukien, topotypes of *M. hirsutus* (A. B. Howell, Proc. Biol. Soc. Wash., 39, p. 139, 1926), have been used to represent *fimbriatus*. The probability that *hirsutus* is a synonym of *fimbriatus* has been called to my attention by G. M. Allen.

Myotis siligorensis alticraniatus subsp. nov.

Type from Muong Moun, Tonkin. No. 32,174 Field Museum of Natural History. Adult female. Collected March 26, 1929, by R. E. Wheeler. Orig. No. 102.

Diagnosis.—Similar to *M. siligorensis*, but with a smaller skull and weaker dentition. Size very small (forearm 33–35, condylobasal length of skull less than 12). Ears small, narrow, and sharply notched on the outer border; tragus slender, fusiform, nearly uniform in width except at the rather abruptly pointed tip; wing from just proximad of the base of the outer toe; tail slightly longer than the head and body. Skull very small with high, abruptly vaulted cranium; canines short and weak.

Color.—Upper parts dark Blackish Brown, the tips of the hairs scarcely lighter than the bases; under parts Buffy Brown superficially, Blackish Brown basally.

Skull and teeth.—Skull very small and light; braincase unusually high, its height nearly 80 per cent of its width so that from above

the cranium has almost the appearance of globosity. Teeth similar in general to those of *M. mystacinus*, but weaker, the molars narrower and the canines lower; outer upper incisor separated from canine by a space slightly less than its width; anterior upper premolar with a higher crown than the following one, but the diameter of its shaft only slightly greater; small premolars directly in line in the toothrow, separated from the large premolar by a slight space; upper canines slightly higher than last premolars; lower canines smaller than last premolars and, in spite of their position, with their points standing lower in the toothrow than those of the large premolars; first lower premolar only slightly smaller than canine.

Measurements.—Seven adults measured by the collector: total length 71 (65–78); tail 36.7 (34–38); hind foot 7.4 (7–8). Forearms (dry) 34.7 (33–35.4); ear from meatus (dry) 8. Skull of type: greatest length 12; condylo-basal length 11.4; zygomatic width 7; interorbital constriction 2.9; width of braincase 5.7; depth of braincase 4.5; maxillary toothrow 5.3.

Remarks.—This bat is characterized by its high, vaulted cranium and its very small size, being apparently the smallest Old World species of *Myotis*. This diminutiveness is evidenced more by the skull than by external measurements, since the length of the forearm equals that of some other forms. It belongs to the group typified by *M. mystacinus* among which Thomas (Jour. Bomb. Nat. Hist. Soc., **23**, p. 609, 1915) has recognized two series, one with a lower braincase and longer canines as in typical *mystacinus* and another with high braincase and short, small canines. In the present knowledge of the group, it might be convenient to treat all the named forms as subspecies of *mystacinus* (as doubtless most of them will eventually prove to be), but with two types occupying the same region in India, it seems probable that the one showing the greatest departure from *mystacinus* may be specifically distinct. Therefore the present form is linked with *siligorensis* rather than *mystacinus*.

Except for one example from Dakto, Annam, of which the skull is not available, I have been unable to find any specimens of this supposed new form in the collection of the British Museum, including the large accessions from India recently received through the survey of the Bombay Natural History Society. It seems most closely related to *siligorensis*, of which very few specimens except the type are known. The skull of this type (from Nepal) lacks the basicranial parts, but it is evident that the braincase is of the high form. Its

upper toothrow measures 5.7 and the teeth, although larger and wider, are in general proportions similar to those of *alticraniatus*.

The names *caliginosus*, *blanfordi*, and *moupinensis* apply to forms with relatively low braincases, and *nipalensis* (Dobson, Proc. As. Soc. Beng., p. 214, 1871; Monog. As. Chiropt., p. 302, 1878) can scarcely fail to be a synonym either of *caliginosus* or of *siligorensis*. The form from Fukien called *sowerbyi* (A. B. Howell, Proc. Biol. Soc. Wash., **39**, p. 138, 1926), as shown by a series loaned by the United States National Museum, is closely allied to *siligorensis* and differs from *alticraniatus* precisely as does the type of *siligorensis*, namely, in decidedly larger size. If better material should prove *sowerbyi* separable from *siligorensis*, it would still be necessary to consider *laniger* (Peters, Proc. Zool. Soc. Lond., p. 617, 1870) which comes from a near-by locality (Amoy, China) and which is described as having the same general dimensions.

Specimens examined.—Total number 7 (skins) all from the type locality.

Pipistrellus abramus Temminck.

Vespertilio abramus Temminck, Monog. Mamm., **2**, p. 232, pl. 58, figs. 1, 2, 1841—Nagasaki, Japan.

K.-R.—Quangtri, Phouc Mon, A. 12 (sk.), 4 (alc.).

REC. 1925–29.—Huê, A. 2.

Identical with specimens in the British Museum referred by Thomas to *abramus*. Twelve carefully prepared skins show scarcely any variation in color, all being uniformly light brown.

Pipistrellus mimus Wroughton.

Pipistrellus mimus Wroughton, Jour. Bomb. Nat. Hist. Soc., **12**, p. 722, pl., figs. 3, 3a, 1899—Mheskatri, Surat Dangs, India.

K.-R.—Quangtri, Phouc Mon, A. 1 (sk.).

The single skin is indistinguishable in color from specimens of *abramus* from the same locality, but the short forearm (28.2) and small short skull are distinctive and exactly as in numerous specimens from India representing *mimus*.

Pipistrellus coromandrus tramatus Thomas.

Pipistrellus coromandrus tramatus Thomas, Proc. Zool. Soc. Lond., p. 144, 1928—Backan, Tonkin.

K.-R.—Quangtri, Phouc Mon, A. 2 (sk.); Luang Prabang, L. 1 (sk.); Ngai Cho, T. 1 (sk.); Phong Saly, L. 1 (sk.).

DEL. 1931–32.—Thateng, L. 1.

REC. 1925–29.—Backan, T. 10; Phuqui, A. 3; Thai Nien, T. 17.

Three of the specimens in the collection are very sooty in color, a variation commonly found in these small bats. They were compared with the type of *tramatus* and found to be in substantial agreement with it, but until a thorough study of the smaller oriental Vespertilionidae is made, much confidence cannot be placed in identifications of individual specimens.

Pipistrellus tralatitius Horsfield.

Vespertilio tralatitius Horsfield, Zool. Res. in Java, unpaged, 1824—Java.

REC. 1925–29.—Tam Dao, T. 3.

Not represented in the collections of the Kelley–Roosevelts Expedition.

Pipistrellus raptor Thomas.

Pipistrellus raptor Thomas, Ann. Mag. Nat. Hist., (7), **13**, p. 387, 1904—Tonkin.

Not represented in recent collections and apparently still known only from the original series of six specimens from "Tonkin."

Tylonycteris pachypus fulvida Blyth.

Scotophilus fulvidus Blyth, Jour. As. Soc. Beng., **28**, p. 293, 1859—Schwegyin, Burma.

Tylonycteris rubidus Thomas, Ann. Mag. Nat. Hist., (8), **15**, p. 227, Feb., 1915—lapsus for *T. fulvida*.

Tylonycteris fulvida Wroughton, Jour. Bomb. Nat. Hist. Soc., **25**, pp. 586–587, 1918.

K.–R.—Muong Mo, T. 5 (sk.), 1 (alc.); Muong Mo, T. 1 (sk.); Phong Saly, L. 9 (sk.), 5 (alc.).

REC. 1925–29.—Bao Ha, T. 1; Dakto, A. 2; Ngai Tio, T. 1.

Thomas (l.c.) has called attention to marked differences in size in *Tylonycteris* from India and the East Indies, but after drawing specific distinctions he later decided the variation too confusing to maintain them (Wroughton, l.c., p. 586). Similar differences appear in the material from Indo-China and seem to bear out the original conclusion of Thomas. The series available is an unusually good one consisting of thirty-five carefully made skins with perfect skulls and measurements taken by the collector. Two forms are clearly distinguishable among them, one smaller and more rufescent

and the other larger and duller-colored. Differences in the size of the skulls seem to be definitely correlated with length of forearm and with color. At one locality (Phong Saly) both forms occur together without any evidences of intergradation. The smaller, brighter form agrees closely with specimens from India and Burma representing *fulvida*. Its forearm measures 24.7–26 and its skull has a length of about 11 and a zygomatic width of about 8. Collectors' measurements of nine specimens from Phong Saly are: total length 67 (65–70); tail 29.5 (27.5–31); foot 6.1 (5.5–7). The color is nearly uniform above and below, and ranges from Ochraceous Tawny to Cinnamon Brown, the former color prevailing on the basal part of the hairs and the latter on the terminal.

Tylonycteris robustula Thomas.

Tylonycteris robustula Thomas, Ann. Mag. Nat. Hist., (8), **15**, p. 227, Feb., 1915—upper Sarawak, Borneo.

K.-R.—Phong Saly, L. 8 (sk.), 5 (alc.); Quangtri, Phouc Mon, A. 12 (sk.), 5 (alc.).

The two small series above listed do not precisely agree, but they fall together much better than with *fulvida*. Those from Phong Saly are larger and slightly darker. Their forearms measure 26.5–29 and their skulls have a length of about 12.5 and a zygomatic width of about 9.3. Since these approximate the measurements given for *T. robustula*, that name is used for them. The color is deep Mummy Brown somewhat lighter below and the general effect is that of sootiness as compared to *T. fulvida*.

The specimens from Quangtri seem to be somewhat like those referred to by Thomas as "middle," being intermediate in size between the two extremes. They are nearer to the larger form, especially in color, and may perhaps represent a slight differentiation of it without any real, close affinity to *fulvida*.

Discopus denticulus gen. et sp. nov.

Type from Phong Saly, Laos. Altitude 4,400 feet. No. 32,195 Field Museum of Natural History. Female adult. Collected May 3, 1929, by Russell W. Hendee. Orig. No. 5,522.

Diagnosis.—Externally similar to *Pipistrellus*, but tragus longer and more slender although not pointed at the apex; ears longer and narrowed at the tip; hind feet with highly developed disklike pads even more extreme than in *Tylonycteris* and *Glischropus*. Skull

with a broad, greatly flattened braincase, somewhat as in *Tylonycteris* but with a longer, narrower rostrum; dentition with two upper and three lower premolars on each side, the middle lower pair small and internal to the toothrow.

Color.—Upper parts Cinnamon Brown, the hairs unicolored from base to tip; under parts brighter-colored, nearly Amber Brown, the hairs with darker bases.

Skull.—Braincase depressed or flattened to nearly the same extent as in *Tylonycteris;* rostrum decidedly longer than in *Tylonycteris* or *Pipistrellus* and somewhat upturned anteriorly, with a pronounced depression in the interorbital region; zygomata widely expanded; antorbital processes not developed; palate relatively long; basioccipital wide; coronoid process of mandible high and blunt, its posterior border slightly concave; dentition with two upper and three lower premolars; I. $\frac{2}{2}$; C. $\frac{1}{1}$; Pm. $\frac{3}{3}$; M. $\frac{3}{3}=34$; general form of teeth not peculiar, but in the molariform series the teeth are wider in proportion to length than in *Pipistrellus, Glischropus* and *Tylonycteris;* inner upper incisor bifid; outer upper incisor normal in position, nearly or quite equal in size and height to the inner one and separated from the canine by a slight space; anterior upper premolar in contact with canine, but slightly separated from posterior premolar; middle lower premolar minute, rounded and slightly internal to toothrow.

Measurements.—Four adults measured by the collector: total length 83 (81–86); tail 40 (39–42); hind foot 6. Adult in alcohol: forearm 37.8; second finger, metacarpal 31.7; third finger, metacarpal 34.2; first phalanx 16.2; second phalanx 14.8; fourth finger, metacarpal 32.6; first phalanx 9.8; second phalanx 8.5; fifth finger, metacarpal 32.2; first phalanx 9; second phalanx 7.5; tibia 17.2; hind foot 6.2. Skull of type: greatest length 14.2; condyle to front of canine 13.2; palatal length 6.5; front of orbit to end of premaxilla 4.7; zygomatic width 9.7; mastoid width 7.9; interorbital constriction 3.6; depth of braincase 3.9; width outside molars 5.8; front of canine to back of molars 5.4; lower toothrow to front of canine 5.8.

Remarks.—This bat combines to some extent certain characters of *Pipistrellus, Glischropus,* and *Tylonycteris.* It differs from all of them in the possession of three pairs of lower premolars. From *Pipistrellus* and *Glischropus* it is further distinguished by its greatly flattened braincase which suggests that of *Tylonycteris,* but since this last genus has only one upper premolar, it is well distinguished. The

adhesive disk on the foot is even larger than in *Glischropus* and *Tylonycteris*. In alcoholic specimens it is subrectangular in shape yellowish in color, and it measures about 4.7 by 3.3.

The middle pair of lower premolars is uniformly present in the six specimens examined, so there seems no reason to question its being a normal condition. The species was taken only at Phong Saly, Laos.

Galeopterus variegatus subsp. FLYING LEMUR.

REC. 1925–29.—Tay Ninh, C.C. 1.

Thomas (1929, p. 833) has recorded one specimen under the name *pumilus*, the applicability of which seems doubtful. It constitutes the easternmost continental record of the genus.

Hylomys suillus microtinus Thomas.

Hylomys suillus microtinus Thomas, Proc. Zool. Soc. Lond., p. 497, 1925—Thai Nien, Tonkin.

K.–R.—Phong Saly, L. 1.
REC. 1925–29.—Bao Ha, T. 1; Thai Nien, T. 1.

A specimen from Phong Saly collected by Hendee brings the known examples of this form to a total of three. It agrees essentially with the type which seems well distinguished from *peguensis* and *siamensis* by its darker and more uniform color.

Hylomys suillus siamensis Kloss.

Hylomys siamensis Kloss, Jour. Nat. Hist. Soc. Siam, 2, p. 10, 1916—Hinlap between Saraburi and Korat, south-central Siam.

REC. 1925–29.—Dakto, A. 12; Xieng Kuang, L. 1.

Following Thomas, these specimens may be referred to *siamensis* but material not available to Kloss seems to indicate that *siamensis* is more closely similar to *peguensis* than has been supposed. Specimens in Field Museum from the Namting River at the Burma-Yunnan border, referred by G. M. Allen to *peguensis*, do not differ in color from the type of *siamensis*. Whether these really represent *peguensis*, however, cannot be determined with certainty until specimens are obtained from Lower Burma in the region of the type locality (Schwegyin, Lower Burma). Kloss mentions the narrower nasals of *siamensis* as compared with *suillus* and this character is shown by the Annamese specimens when compared with the supposed

peguensis from Upper Burma. Further locality records are Sikortur (northwest of Raheng), Me Taw, and Pakchan, Siam (Kloss, Jour. Nat. Hist. Soc. Siam, Suppl., 8, p. 77, 1930).

Neotetracus sinensis fulvescens subsp. nov.

Type from Chapa, Tonkin. No. 32.4.19.3. British Museum. Adult female. Collected Dec. 2, 1930, by J. Delacour and W. Lowe. Orig. No. 1,520.

Diagnosis.—Similar to *N. sinensis* of western China, but under parts usually more heavily suffused with fulvous; skull larger; dentition heavier.

Color.—Upper parts much as in *N. sinensis*, but averaging more ochraceous in tone, the prevailing color inclining to Cinnamon Brown rather than Dresden Brown; under parts usually with a heavy wash of Ochraceous Tawny either covering the entire under surface or most of the chest and belly, less developed in young animals and often very intense in old ones; feet whitish with a dark line down the outer side to the base of the toes; tail sharply bicolor, dusky above, narrowly white below.

Skull.—Larger and heavier than in *sinensis*, the greatest length reaching to 37.7; dentition heavier.

Measurements.—Average of ten adults: total length 198 (185–229); head and body 129 (121–148); tail 68 (63–82); hind foot 24.4 (23–26). Skull of type: greatest length 33.4; zygomatic width 17.8; width between postorbital processes 8.6; median length of nasals 11.4; width of braincase 14.1; upper toothrow from front of canine 16.7; molariform toothrow 7.2.

Remarks.—The insectivorous genus *Neotetracus*, previously known only from western China, is represented by a large series from Chapa, Tonkin. There are thirty-seven specimens of which eight are in alcohol. As compared with a series of ten from Yunnan in Field Museum, representing *sinensis*, these are conspicuously more fulvous below, but the Yunnan specimens are mostly subadult and there seems to be a tendency for the older individuals to be the most fulvous. Further comparison with aged examples of *sinensis*, therefore, would be desirable. Skulls of comparable ages show a definite increase in general size and in that of the dentition in the Indo-Chinese form.

Tupaia belangeri chinensis Anderson. CHINESE TREE SHREW.

Tupaia chinensis Anderson, Zool. Res. West Yunnan, p. 129, pl. 7, figs. 8, 9, 1879—Ponsee, Kakhyen Hills, near Burma border, Yunnan, China.

K.–R.—Likiang, Yunnan 1; Nguluko, Yunnan 6.

These localities doubtless are near the northern limit of tree shrews, since Stevens obtained no further specimens after leaving the Likiang region. The specimens were taken in February and are in full winter pelage in which the body color encroaches extensively on the sides of the belly. The summer pelage is shown by three specimens in Field Museum taken at Yunnan Yi early in September just before the transition to the winter coat. Two of these have the under parts wholly light-colored and the third is in process of change. Except for their much paler under parts, therefore, they are much like *modesta* in the same pelage.

Tupaia belangeri modesta J. A. Allen. HAINAN TREE SHREW.

Tupaia modesta J. A. Allen, Bull. Am. Mus. Nat. Hist., 22, p. 481, 1906—Lei Mui Mon, island of Hainan.

Tupaia belangeri yunalis Thomas, Ann. Mag. Nat. Hist., (8), 13, p. 244, 1914—Mongtze, Yunnan.

Tupaia belangeri tonquinia Thomas, Proc. Zool. Soc. Lond., p. 497, 1925—Bao Ha, Tonkin.

K.–R.—Bactan Trai, T. 1; Chapa, T. 1; Lieng San, T. 2; Muong Boum, T. 1; Muong Yo, L. 1; Nam He, T. 1; Pa Ham, T. 1; Phong Saly, L. 6; Phong Tho, T. 1.

D. & L. 1929–30.—Chapa, T. 10; Hoi Xuan, A. 8; Lung Lunh, A. 1; Pakha, T. 1.

DEL. 1931–32.—Thateng, L. 12.

REC. 1925–29.—Backan, T. 6; Bao Ha, T. 2; Chora, T. 1; Col des Nuages, A. 4; Dakto, A. 1; Kontoum, A. 1; Muong Sen, A. 3; Napé, L. 4; Ngai Tio, T. 3; Phuqui, A. 3; Thai Nien, T. 1; Thua Lua, A. 2; Xieng Kuang, L. 18.

In all the large series of tree shrews from Indo-China accumulated through the various expeditions since 1924, by far the greater number are in full winter pelage. In this pelage the hairs of the under parts usually have dark bases throughout and the body color is extended over the sides of the belly, leaving only a narrow midventral line of lighter color continuous with expanded areas of the same on the chest, throat and unguinal region. As indicated mainly by specimens showing its beginning or ending, the summer pelage is quite different, the under parts being light-colored throughout, the hairs mostly

self-colored, and the under parts as a whole well distinguished from the upper parts. In the few specimens in full summer pelage, the line of demarcation is sharply marked.

Seven specimens in the Kelley–Roosevelts collection from Phong Saly and Muong Yo, Laos, are very illuminating. They were taken on or about May 1 and are in various stages of transition from one pelage to the other. Only one of the adults retains traces of the winter color of the under parts although both pelages of the upper parts are plainly evident in all. With them are two young examples in a full, fresh pelage closely resembling the usual winter pelage and in very great contrast to the adults from the same locality in which the summer pelage is being acquired. In one specimen from Chapa, Tonkin, taken October 30, transition from summer to winter is shown. New pelage covers the anterior half of the under parts and the hairs are with dark bases, but the posterior half has the light, self-colored hairs of the summer pelage and is thus practically indistinguishable so far as this area is concerned from the spring specimens from Phong Saly.

After examination of more than ninety specimens, I am unable, on the basis of the winter pelage, to draw any constant distinctions between the tree shrews of the island of Hainan and those of the mainland or between those of highlands and lowlands from northwestern Tonkin and northern Laos to central Annam. So far as it is represented, the summer pelage also furnishes no grounds for division. There is some variation in depth of color, but this cannot be correlated with locality. Extremes of olivaceous and reddish brown occurring indiscriminately seem to point to a slight dichromatism. A fairly common variation is in the coloration of the chin and throat where, even in winter, the hairs may be light-colored to their roots, although usually with dark bases.

Topotypes of *modesta* from Hainan, loaned by the American Museum of Natural History, can be matched in every detail by specimens from the mainland and, although larger series especially from Hainan would be desirable, it seems quite impossible with present material to mention any differentiating character. In 1925, when Thomas proposed the name *tonquinia*, he had only a half dozen mainland specimens and still fewer from Hainan. The supposed difference in the amount of black in the tail does not hold when series are examined.

The type of *T. b. yunalis* was taken in July and this doubtless accounts for its light under parts. Moreover, the type locality

(Mongtze, Yunnan) is not far from that of *tonquinia* and in a region in which the fauna is known to be preponderantly the same as that of northeastern Tonkin. Therefore, the distinction of *yunalis* cannot be maintained, at least not until both pelages are better represented in collections than at present. *T. b. laotum* (Thomas, Ann. Mag. Nat. Hist., (8), **13**, p. 244, 1914) from Nan, northern Siam, has not been examined, but in view of the wide distribution of *modesta* and the supposed intergradation with *concolor*, the slight characters assigned to it may need confirmation.

Tupaia belangeri concolor Bonhote.

Tupaia concolor Bonhote, Abstr. Proc. Zool. Soc. Lond., p. 2, Jan. 22, 1907; Proc. Zool. Soc. Lond., p. 7, June, 1907—Nhatrang, Annam.

REC. 1925–29.—Bokor, C. 2; Sambor, C. 1; Siem Reap, C. 3; Tay Ninh, C.C. 2.

Although supposed to have only two pairs of mammae instead of the three usual in the *belangeri* series, this form is regarded by Kloss and Thomas as only subspecifically separable. A specimen in Field Museum from Bangkok, Siam, plainly has but two pairs of mammae. A further complication is *T. glis cambodiana* Kloss (Jour. Nat. Hist. Soc. Siam, **3**, p. 357, 1919) which is stated to have six mammae and to inhabit the same region as *concolor*.

Dendrogale frenata Gray. PIGMY TREE SHREW.

Tupaia frenata Gray, Ann. Mag. Nat. Hist., (3), **6**, p. 217, 1860—Cambodia.

D. & L. 1929–30.—Ninh Hoa, Nhatrang, A. 1.
REC. 1925–29.—An Binh, C.C. 4.

These are among the very few examples of the species thus far recorded.

Talpa klossi Thomas. SIAMESE MOLE.

Talpa klossi Thomas, Ann. Mag. Nat. Hist., (10), **3**, p. 206, Feb., 1929—Hue Nya Pla, 10 miles n.w. of Raheng, Siam.

D. & L. 1929–30.—Chapa, T. 6.
DEL. 1931–32.—Thateng, L. 2.

The discovery of moles in Tonkin increases the probability of connection with the forms of northern India. The specimens are in complete agreement with the description of *T. klossi*, the skulls being decidedly smaller and narrower than in *T. micrura* of which

a series is now available in Field Museum, obtained by the Cutting Sikkim Expedition. The external and cranial resemblance of *klossi* to *P. leucurus* is evidently so close that suspicion seems justified as to the normality of the numerical difference in dentition.

Parascaptor leucurus Blyth. WHITE-TAILED MOLE.

Talpa leucura Blyth, Jour. As. Soc. Beng., **19**, p. 215, pl. 4, figs. 1, 1a, 1850—Cherrapunji, Assam.

REC. 1925–29.—Xieng Kuang, L. 1.

This specimen has not been examined, but the record by Thomas is accepted although his failure to make any reference to it when describing *Talpa klossi* seems rather unaccountable.

Chimarrogale himalayica Gray. HIMALAYAN WATER SHREW.

Crossopus himalayicus Gray, Ann. Mag. Nat. Hist., (1), **10**, p. 261, 1842—"Himalayas," India.

K.–R.—Phong Saly, L. 1.
D. & L. 1929–30.—Chapa, T. 2.

Water shrews from Tonkin and Laos appear referable to the Himalayan form and do not especially approach the one recorded from Annam or that from Fukien. They differ from typical *himalayica* in somewhat paler, less brownish under parts, but the material is so limited that it seems inadvisable to add any further names. Collector's measurements of an adult male are: total length 213; tail 84; hind foot 26.

The type of *himalayica* in the British Museum is a "dismounted," stuffed skin somewhat altered by exposure to light and its skull is represented only by tiny fragments to which are attached the upper incisors, five of the upper unicuspids, one lower incisor, and one lower unicuspid. There are three additional specimens from Sikkim including one skull without braincase but with the antecranial part and all the teeth intact. The teeth of Indo-Chinese specimens agree in size with those of the type and the other specimen examined from Sikkim. In size of teeth *himalayica* stands well differentiated from the other continental members of the group and perhaps does not intergrade with them. The others, however, differ among themselves mainly in the size of the teeth, *styani* (Szechwan) being smallest, *leander* (Fukien) slightly larger, and *varennei* (Annam) a little larger still; but none of them equals *himalayica*. It is not

improbable, therefore, that gradation from one to the other will eventually be found.

External characters are difficult to evaluate with only one or two specimens of each form available. In *styani* (two specimens only) the under parts are very light-colored and this silvery extends to the upper lips and sides of the face; in *leander* (type only) the entire under parts are so worn that they appear scarcely lighter than the upper parts, but the white on the under side of the tail is marked although extending for only two-thirds its length; in *varennei* (type only) the tail is wholly dark and thus unique among continental forms.

The group to which these water shrews belong is a very compact one. The species of Borneo (*phaeura*) and Sumatra (*sumatrana*) have been placed separately in a genus *Crossogale* (Thomas, Ann. Mag. Nat. Hist., (9), 7, p. 243, March, 1921), although it is obvious that they are very closely allied to the continental ones belonging to true *Chimarrogale*. This close relationship, which may be of much zoogeographic importance, was recognized when both continental and insular species were included in *Chimarrogale*. Dividing them into two genera obscures the relationship and unless the distinctions between them should be very pronounced, would seem to be a disadvantage rather than otherwise. These distinctions are relative, not absolute, and consist only in the development in *Crossogale* of an inner cusp on the upper incisors making them imperfectly bifid. This cusp is found in an incipient condition in *Chimarrogale* and, if a large number of specimens were available, it is not unlikely that occasional ones would show more of it. It is the normal condition in *Soriculus*.

There are then two significant facts about this group: (1) the obvious relationship of the continental and insular species; and (2) the pronounced development of a supplementary inner cusp in the upper incisors of the two island species. One of these facts is emphasized by using only one generic name and the other by using two generic names. If *Crossogale* were given only subgeneric rank, however, the nomenclature and both facts would be in complete conformity. It seems to be a particularly good illustration of the undesirable results obtained by overemphasis of the generic category of classification.

Crocidura dracula Thomas.

Crocidura dracula Thomas, Ann. Mag. Nat. Hist., (8), **9**, p. 686, June, 1912 —near Mongtze, Yunnan.

Crocidura praedax Thomas, Ann. Mag. Nat. Hist., (9), 11, p. 656, June, 1923—Likiang valley, Yunnan.

K.–R.—Ba Nam, T. 1; Chapa, T. 1; Lai Chau, T. 2; Muong Chao Noi, near Phong Saly, L. 1; Muong Mo, T. 1; Nguluko, Yunnan 2.
D. & L. 1929–30.—Chapa, T. 40 (35 sk., 5 alc.); Hoi Xuan, A. 1.
REC. 1925–29.—Ngai Tio, T. 3.

Although not taken in numbers by the Kelley–Roosevelts Expedition, the very large series obtained by Delacour and Lowe at Chapa seems to indicate that this is the most common shrew of the elevated parts of Tonkin. It is also well represented in Field Museum by numerous specimens from the Likiang region of Yunnan, type locality of *C. praedax*.

Examination of the types of both *dracula* and *praedax* in the British Museum shows only differences which are quite bridged over in the series. The slight color differences noted by Thomas prove to be entirely seasonal and any attempt to substantiate a northern form on the basis of larger size is negatived by the occurrence of numerous large specimens in the more southern localities. The largest of all examined are three from the Namting River at the Burma border. The single specimen from Hoi Xuan, which is still farther removed from Likiang, is distinctly larger than the type of *praedax*. A decidedly immature specimen from Laos is very much darker than any of the adults. It seems necessary, therefore, to regard *dracula* and *praedax* as the same and to conclude that minor size variations, as in several others of the smaller insectivores of the region, do not in this case have classificatory significance.

The supposed relationship of *C. griscescens* Howell to *C. dracula* appears to need substantiation by further specimens. A topotype, loaned by the United States National Museum, has a shorter tail than in *dracula*, and the imperfect skull is smaller with a shorter toothrow. In fact, the skull and teeth show very close agreement with some of the larger examples of *attenuata* from Szechwan. The hind foot is rather large, but the specimen has the appearance of having been remade, perhaps from alcohol, so measurements taken from it are probably untrustworthy.

Crocidura attenuata Milne-Edwards.

Crocidura attenuata Milne-Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, 7, p. 92, 1872; Rech. Mamm., p. 263, pls. 38b, 39a, 1868–74—Mouping, Szechwan.

K.–R.—Yachowfu, Szechwan 1.

This common Chinese shrew is represented by one specimen taken by Jack Young, interpreter for Theodore and Kermit Roosevelt.

Crocidura vorax G. M. Allen.

Crocidura vorax G. M. Allen, Am. Mus. Novit., No. 100, p. 8, Dec., 1923—Snow Mountain, near Likiang, Yunnan.

K.–R.—Nien Yuenfu, Szechwan 1.

This specimen, taken in April, is considerably paler than one from Likiang, taken in November, but otherwise is closely similar.

Crocidura indochinensis Robinson & Kloss.

Crocidura indochinensis Robinson & Kloss, Ann. Mag. Nat. Hist., (9), 9, p 88, Jan., 1922—Dalat, Langbian Plateau, Annam.

D. & L. 1929–30.—Chapa, T. 2 (alc.).

Two small shrews in alcohol appear to represent this species, with the description of which they agree in dimensions and cranial characters. They are rather smaller than *C. vorax*, but their upper unicuspids have similar proportions and, therefore, as suggested by G. M. Allen, they may be allied to that species. The upper toothrow in one specimen measures 7.3; width of palate including molars 5.2.

Suncus caeruleus Kerr. MUSK SHREW.

Sorex caeruleus Kerr, Anim. King., p. 207, 1792—India.

K.–R.—Phouc Mon, Quangtri, A. 14.

No attempt has been made to determine these other than as members of the *caeruleus* series, formerly known under the name *murina* and more recently as *myosurus*. The Indian forms have been studied recently (Lindsay, Jour. Bomb. Nat. Hist. Soc., 33, pp. 326–340, Feb., 1929), but the identification of outlying specimens is still difficult owing, as Mrs. Lindsay states, to the unnatural dispersal of the animals which has taken place through railways and steamships. A large adult from the present series measures: total length 230; tail 81; hind foot 22.5.

Blarinella wardi Thomas. WARD'S SHORT-TAILED SHREW.

Blarinella wardi Thomas, Ann. Mag. Nat. Hist., (8), 15, p. 336, 1915—Hpimaw, Upper Burma.

K.–R.—Nguluko, near Likiang, Yunnan 1.

A single specimen of the rare genus *Blarinella* may be referred to this species. The skull, which is imperfect anteriorly, has a braincase with a width of 8.5 mm., exactly the dimension given for the type of *wardi*. The breadth between the outer edges of the glenoid processes is 5.2 mm.

Anourosorex squamipes Milne-Edwards.

Anourosorex squamipes Milne-Edwards, Comptes Rendus, Acad. Sci. Paris, 70, p. 341, 1870—Mouping, Szechwan, China.

Anourosorex squamipes capnias G. M. Allen, Am. Mus. Novit., No. 100, p. 10, Dec. 28, 1923—To-mu-lang, Chung Tien, Yunnan, China.

Anourosorex assamensis capito G. M. Allen, supra cit., p. 11—Mucheng, Salween drainage, Yunnan, China.

K.-R.—Chapa, T. 7.

D. & L. 1929–30.—Chapa, T. 30 (4 alc.).

The series of more than thirty specimens from a single locality in Tonkin shows a range of variation in size and color completely covering the supposed distinctions between several named forms. After studying this series and all the specimens in the British Museum (about sixty in number) representing various localities from northern Szechwan to Assam, together with topotypes and material from the original series of the two forms described by Allen, I can find no logical basis for division of the group beyond the recognition of *squamipes* as a wide-ranging, variable species with one local differentiation (*assamensis*) confined to certain parts of Assam.

Available material from Szechwan representing typical *squamipes* does not show such variation in size as that from more southern localities, but the preponderance of the southern specimens is practically indistinguishable. The extremes of size shown in various of the southern series are very puzzling, but they do not seem to have any geographic or altitudinal basis, since they occur indiscriminately in Yunnan, Assam, Burma and Tonkin. Color and dental characters also fail when large series are examined. The "greenish" color of the under parts supposed to characterize *capito* occasionally appears in Szechwan specimens and in the Tonkin series there is evidence that it may be largely, if not wholly, seasonal. This series includes material taken by two different parties at different dates. Specimens obtained by Delacour and Lowe in early December are mostly in a "bluish" plumbeous coat showing evidence of wear and obviously being a summer or autumn pelage about to be renewed. Several specimens show the renewal beginning and have

patches of the "greenish" appearing on the under parts. These specimens, therefore, are carrying parts of two pelages, one bluish and the other greenish. Specimens from the same locality taken two months later by the Kelley–Roosevelts Expedition in February are in a fresh new pelage in which the hair is soft and long and the under parts mostly greenish or brownish.

The notch in the second upper incisor is usually found in young unworn teeth, while in the old worn ones it has disappeared, but it is not always well marked in young examples and in almost every series examined there are specimens that show it and others that do not.

The only evidence of pronounced and constant distinction from *squamipes* is shown by two series from the Jaintia Hills and the Mishmi Hills, Assam. These are constantly larger and have coarser pelage than *squamipes* even when this is regarded in a broad sense to include the larger specimens found recurrently in Yunnan, Burma, and Tonkin. It is probable, therefore, that the large head ascribed to *assamensis* by Anderson was that of a specimen of this kind and it may be possible to recognize *assamensis* as a local race of *squamipes*. That it is quite local is shown by a single specimen from the Garo Hills, eastern Assam, which is smaller and not appreciably different from typical *squamipes*.

Measurements of a skull of average size from Shangpung, Jaintia Hills, and of a somewhat larger one from Mishmi Hills are as follows: superior margin of foramen magnum to tip of premaxillae[1] 25.1, 26; greatest length including incisors 26.4, 27.3; palatal length 11.9, 12.2; mastoid width 14.2, 14.9; upper toothrow 12.2, 12.5.

In 1916 Wroughton (Jour. Bomb. Nat. Hist. Soc., **24**, p. 766) referred specimens from the Chin Hills, Burma, to *A. squamipes*, quoting O. Thomas as follows: "After very careful examination, I fail to find any character by which this animal can be distinguished from the *A. squamipes* of Szechwan." At that time the large specimens from Assam, referred to above, had not been received and later when they were listed by Hinton and Lindsay (Jour. Bomb. Nat. Hist. Soc., **31**, p. 391, Aug., 1926), the name *squamipes* was applied to them without comment, this doubtless being due to the previously expressed conclusions of Wroughton and Thomas. Meanwhile, without access to any of this material, but with appreciation of the large size of *assamensis* as originally described, G. M. Allen (supra cit.) found what appeared to be a larger and a smaller form

[1]This measurement for his type is given by Anderson as 1.04 inches.

at different altitudes in Yunnan and he naturally regarded one as being related to *squamipes* and the other to *assamensis*. This interpretation is perhaps still possible, but a review of practically all existing specimens does not give it confirmation and, unless careful field studies not yet made should demonstrate some logical segregation of the larger and the smaller *Anourosorex* throughout its range, the recognition of several forms cannot be justified. In order to recognize *squamipes*, *capito*, and *capnias*, it would almost be necessary to assume that all three occur at one locality in Tonkin.

In the large series of this genus in the British Museum, the prominence of the elongated hairs of the rump is very striking. This does not seem to be correlated with sex but probably is connected with some glandular development. In 90 per cent of the specimens, these hairs are much elongated, forming an elevated tuft, almost a brush, on the rump. The hairs in most cases are paler than on other parts, rusty brownish or even whitish. Usually they are glistening with a mucilaginous exudation, or frequently matted together with it. The simulation of caked soil or other inorganic matter suggests that there is some connection with the burrowing habit, but examination of the hairs under a hand lens usually shows nothing on them except the above-mentioned exudate. This has been referred to casually by Anderson and Allen, but it appears to deserve emphasis, evidently being a unique character which would well repay study in the field with living animals and which should be examined by dissection of fresh specimens.

Chodsigoa lowei sp. nov.

Type from Chapa, Tonkin. No. 32.4.19.4. British Museum. Adult male. Collected Nov. 23, 1929, by J. Delacour and W. Lowe. Orig. No. 1,298.

Diagnosis.—Size medium; tail considerably longer than head and body; skull with a high, narrow braincase very different from the broad, flattened type usual in the genus.

Color.—Entire body Dark Mouse Gray slightly tinged with brownish on the chest and throat; sparse hairs on feet wholly dusky; tail dusky above, very slightly lighter below in proximal fourth; tip (3 mm.) of tail white; whiskers mainly white or dusky with white tips.

Skull.—General shape long and slender; braincase high, narrow, and smoothly rounded without trace of a sagittal ridge; projection

of glenoid fossa reduced and but slightly evident from above; teeth somewhat narrower than in *C. hypsibia* although the length of the toothrow may be slightly greater; molars without pigmentation.

Measurements.—Collectors' measurements of type: total length 163; head and body 77; tail 86; hind foot 15. Skull of type: greatest length 20.4; condylo-basal length 19.2; interorbital constriction 5; width of braincase 9.3; height of braincase 5.3; length of palate 7.8; width of palate with molars 5.7; postpalatilar length 9.1; upper toothrow 8.8; lower toothrow 8.2.

Remarks.—Although the collection contains but one specimen of this species, its characters are very marked and it cannot be referred to any named form. The shape of the braincase shows none of the flattening seen in *C. hypsibia* and *C. smithi*. In fact it goes almost to the opposite extreme in which the sides of the braincase are approaching the vertical. There is no trace of a sagittal crest and the cranial outlines are essentially as in typical *Soriculus*. To this extent, therefore, it breaks down the distinctions between *Chodsigoa* and *Soriculus*, leaving only the presence or absence of the minute premolar and the pigmentation of the molars to separate them.

This is the first and only record of *Chodsigoa* south of China. The species is named for Willoughby Lowe.

Chodsigoa smithi Thomas.

Chodsigoa smithi Thomas, Abstr. Proc. Zool. Soc. Lond., p. 4, 1911—Tatsienlu, Szechwan.

K.-R.—Yulongkong, Szechwan 1.

Collector's measurements are: total length 171; tail 75; hind foot 16. Greatest length of skull 23.5; width of braincase 10.9; upper toothrow 10.3.

Soriculus leucops Horsfield. INDIAN LONG-TAILED SHREW.

Sorex leucops "Hodgson," Horsfield, Ann. Mag. Nat. Hist., (2), 16, p. 111, 1855—Nepal.

Sorex macrurus Hodgson, Cat. Mamm. Nepal & Thibet, ed. 2, p. 9, 1863—nomen nudum.

Soriculus macrurus "Hodgson," Blanford, Mamm. Brit. India, p. 231, 1891—Darjeeling, India.

D. & L. 1929–30.—Mount Fan Si Pan (alt. 10,000 feet), near Chapa, T. 1 (alc.).

A single alcoholic specimen is evidently allied to the small long-tailed shrew of northern India. No Indian specimens are at hand, but comparison with a specimen of *S. irene* (probably a subspecies of *leucops*) shows the skulls to be very similar, that of *irene* being slightly larger. Measurements taken from the alcoholic specimen are: total length 163; tail 95; hind foot with claws 15.8. Greatest length of skull 17.7.

Soriculus baileyi Thomas. BAILEY'S LONG-TAILED SHREW.

Soriculus baileyi Thomas, Jour. Bomb. Nat. Hist. Soc., 22, p. 683, 1914—Tsu River, Mishmi Hills, India.

D. & L. 1929–30.—Mount Fan Si Pan (alt. 10,000 feet), near Chapa, T. 11 (1 skin and skull, 3 skins, 7 alc.).

No comparison of these specimens with the type of *S. baileyi* has been made, but measurements indicate they are closely similar to if not identical with it. The tail length in the eleven specimens ranges from 68 mm. to 76 with an average of 70. Greatest length of skull 21.1; width of braincase 10.1; width of palate with molars 5.4; upper toothrow 9 (9.6);* front of i^1 to front of p^4 4.1 (4.3); combined length of three large unicuspids 2.5 (2.7); height of first unicuspid 1.1 (1.2); length of mandible with incisor 13.3 (14.1).

The genus *Soriculus* has not been recorded before from Indo-China.

Sorex minutus thibetanus Kastschenko.

S[orex] minutus subsp. *thibetanus* Kastschenko, Survey of Mammals of Western Siberia and Turkestan,† p. 93, Tomsk, 1905—Tsaidam, Mongolia.

K.–R.—Muli, Szechwan (10 miles north) 1.

A single tiny shrew obtained by Jack Young may be assigned provisionally to this form. Collector's measurements are: total length 80; tail 33; hind foot 11. The skull is very small with a low, flattened braincase and the fifth upper unicuspid is relatively large but low-crowned and without pigmentation. The greatest length of the skull is 15.1; width of braincase 6.5; upper toothrow 6.5.

Panthera pardus delacouri Pocock. LEOPARD.

Panthera pardus delacouri Pocock, Jour. Bomb. Nat. Hist. Soc., 34, p. 325, pl. 11, July 15, 1930—Huê, Annam.

K.–R.—Phong Saly, L. 2 (skulls).

REC. 1925–29.—Huê, A. 1.

* Measurements in parentheses are those published for the type of *baileyi*.

† Translated title furnished through the courtesy of M. A. C. Hinton.

D. & L. 1929–30.—Huê, A. 1 (type, skin and skull); Quangtri, A. 1 (pelt).

WULSIN 1924.—Baxat, L.? 1 (skull).

The leopard of Indo-China has been distinguished recently by Pocock, the type being a specimen in the Delacour and Lowe collection of 1930. His characterization is as follows: "A race from Annam, recalling *japonensis* in colour but with the rosettes smaller and closer set and with darker centres, and the coat on the body and tail as short and sleek as in the typical Indian panther."

Panthera tigris Linnaeus. TIGER.

Felis tigris Linnaeus, Syst. Nat., ed. 10, p. 41, 1758—Asia.

K.–R.—Phong Saly, L. 1 (skull); Vientiane, L. 1 (skull).

D. & L. 1929–30.—Chapa, T. 2 (pelts).

Felis (Neofelis) nebulosa Griffith. CLOUDED LEOPARD.

Felis nebulosa Griffith, Descr. Vert., p. 37, 1821—Canton, China.

K.–R.—Near Lao Kay, T. 1 (pelt).

Felis (Profelis) temmincki dominicanorum Sclater.

Felis dominicanorum Sclater, Proc. Zool. Soc. Lond., p. 2, pl. 1, 1898—Foochow, Fukien, China.

K.–R.—Lao Fou Chai, L. 1 (pelt); Luang Prabang, L. 1 (pelt).

D. & L. 1929–30.—Huê, A. 1; Lao Bao, A. 1 (pelt).

REC. 1925–29.—Bao Ha, T. 1; Xieng Kuang, L. 1.

Both color phases are represented, one wholly grayish brown and the other wholly bright ochraceous. The skin from Lao Fou Chai, probably of an immature animal, has very soft, long fur and the tail is indistinctly annulated.

Felis (Pardofelis) marmorata Martin. MARBLED CAT.

Felis marmorata Martin, Proc. Zool. Soc. Lond., p. 108, 1836—"Java or Sumatra."

D. & L. 1929–30.—Chapa, T. 1 (pelt).

REC. 1925–29.—Backan, T. 1.

This cat is evidently rare in the region, the records apparently being the most northeastern for the species.

Felis (Zibethailurus) viverrina Bennett. FISHING CAT.

Felis viverrina Bennett, Proc. Zool. Soc. Lond., p. 68, 1833—India.

REC. 1925–29.—Saigon, C.C. 1.

Felis (Felis) affinis fulvidina Thomas. JUNGLE CAT.

Felis affinis fulvidina Thomas, Proc. Zool. Soc. Lond., p. 834, 1929—Tay Ninh, Cochin China.

REC. 1925–29.—Tay Ninh, C.C. 1.

Felis (Prionalurus) bengalensis Kerr. LEOPARD CAT.

Felis bengalensis Kerr, Anim. King., p. 151, 1792—Calcutta, India.

K.-R.—Ba Nam Nhung, T. 1; Muong Moun, T. 4; Muong Yo, L. 1; Phong Saly, L. 2.

D. & L. 1929–30.—"Annam," 2; Hoi Xuan, A. 1; Huê, A. 1; Kratie, C. 1; Lao Bao, A. 1; Pakha, T. 3; Quangtri, A. 1.

DEL. 1931–32.—Thateng, L. 1.

REC. 1925–29.—Backan, T. 11; Huê, A. 1; Ngai Tio, T. 1; Nganson, T. 1; Quang Ngai, A. 1; Quangtri, A. 1; Tay Ninh, C.C. 3; Xieng Kuang, L. 8.

WULSIN 1924.—Lai Chau, T. 1.

The small series from Tonkin and Laos taken by the Kelley–Roosevelts Expedition shows relatively little variation. One old male has the spots of the upper parts much enlarged and with a tendency to confluence into broad stripes. The others vary within quite narrow limits, the ground color light ochraceous with medium-sized black spots and stripes regularly arranged.

Flesh measurements of two adult males are: total length 873, 870; tail vertebrae 300, 315; hind foot 130, 125. Two adult females: 795, 783; 305, 284; 115, 117.

Felis (Prionalurus) chinensis Gray. CHINESE LEOPARD CAT.

Felis chinensis Gray, Ann. Mag. Nat. Hist., n.s., 1, p. 577, 1837—China.

K.-R.—Phouc Mon, Quangtri, A. 1.

In a preliminary examination of the spotted cats of the Kelley–Roosevelts collection, this specimen was noted as so distinct from all others that it was taken to London for comparison with material in the British Museum. An unexpected result was the discovery that it is practically identical with Gray's type of *Felis chinensis*, which is preserved in good condition and which is supposed to have come from Canton. The specimen is a female measured, skinned, and "made up" by Hendee, so there is no question of locality or data. It has a short tail, small feet, and spots reduced to very small flecks except on the legs and under parts where they are much

as in *bengalensis*. Its body color is that of a finely speckled animal rather than that of one heavily spotted or striped. The black spots on the body are numerous, but very small, not exceeding 8 mm. in diameter. The markings about the head, legs, and under parts are as usual in *bengalensis*, but there the resemblance ceases. The common pattern of large spots and stripes on the back and sides is lacking. The small spots are regularly distributed over a ground color of two shades of grayish buff and do not show any tendency to confluence.

Flesh measurements taken by the collector are: total length 697; tail 239; hind foot 108. The skull, so far as preserved, shows no marked departure from that of *bengalensis*. The teeth are smaller than in any specimen of *bengalensis* examined, the length of the carnassial being 9.4 (in *bengalensis* 10–10–6).

This specimen goes so far beyond the wide variation known in *bengalensis* that it seems to require some special explanation, but it is difficult to find any. Its agreement with the type of *chinensis* suggests the possibility that a coastal race may occupy the area from Annam to Canton without ranging inland. In the Delacour and Lowe collection, however, there are specimens supposed to come from the coast of Annam which do not differ greatly from the usual *bengalensis*. The exact localities for these specimens are open to slight question and it is not impossible that they may have been brought from a distance. A specimen from the island of Hainan, as described by J. A. Allen (Bull. Am. Mus. Nat. Hist., **22**, p. 478, 1906), seems, on the other hand, to have the speckled coloration somewhat as in the type of *chinensis* and the specimen from Quangtri under consideration.

The possibility of hybridism, perhaps with the domestic cat, cannot be entirely excluded, but it is difficult to accept the idea that this specimen is a mere color variant of *bengalensis*. Since it agrees with the type of *chinensis*, it is treated under that name and other small spotted cats from Indo-China are referred to *bengalensis*.

Felis (Prionalurus) scripta Milne-Edwards. SZECHWAN CAT.

Felis scripta Milne-Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, 7, p. 92, 1870; Rech. Mamm., p. 341, pls. 57, 58, 1870–74—Mouping, Szechwan.

K.–R.—Tatsienlu, Szechwan 1.

This specimen agrees well with the description and figures of Milne-Edwards and doubtless is a good representative of the cat

named *scripta*. Whether this animal is more than subspecifically separable from *bengalensis* and whether or not it is distinguishable from *microtis* of Peking are questions for future determination.

Viverra zibetha Linnaeus. LARGE INDIAN CIVET.

Viverra zibetha Linnaeus, Syst. Nat., ed. 10, p. 44, 1758—Bengal, India.

K.-R.—Ba Nam Nhung, T. 2; Muong Mo, T. 1; Muong Yo L. 2; Lai Chau, T. 1; Nguluko, Yunnan 1.

D. & L. 1929–30.—Chapa, T. 1; Hoi Xuan, A. 3; Huê, A. 1; Lao Bao, A. 1; Quangtri, A. 1.

REC. 1925–29.—Backan, T. 5; Bao Ha, T. 1; Dakto, A. 1; Kontoum, A. 1; Phu Rieng, C.C. 1; Quangtri, A. 1; Xieng Kuang, L. 2.

Following Allen (Am. Mus. Novit., No. 359, p. 1, 1929), these are referred to the typical Indian form of this variable and widespread species, proper subdivision of which must await a more extensive study than has yet been made. Doubtless there are several recognizable races but attempts to delimit them so far have been unsatisfactory. If an Indo-Chinese form should be demonstrable, it would take the name *surdaster* (Thomas, Proc. Zool. Soc. Lond., p. 46, 1927).

Viverra megaspila Blyth. BURMESE CIVET.

Viverra megaspila Blyth, Jour. As. Soc. Beng., 31, p. 331, 1862—Prome, Lower Burma.

K.-R.—Saigon, C.C. 1.

REC. 1925–29.—Tay Ninh, C.C. 1 (pelt).

Viverricula malaccensis Gmelin. SMALL INDIAN CIVET.

Viverra malaccensis Gmelin, Syst. Nat., ed. 13, p. 92, 1788—Malacca.

K.-R.—Phong Saly, L. 2; Phouc Mon, Quangtri, A. 3; Saigon, C.C. 1.

D. & L. 1929–30.—Chapa, T. 2; Kratie, C. 1; Pakha, T. 1; Phang Ran, A. 2; Saigon, C.C. 2.

DEL. 1931–32.—Bomkieng, L. 1.

REC. 1925–29.—Dakto, A. 1; Langson, T. 4; Napé, L. 2; Ngai Tio, T. 3; Phu Rieng, C.C. 2; Thuy Ba, Quangtri, A. 2.

As between *V. malaccensis* of the Malay States and *V. m. pallida* of southeastern China, the Indo-Chinese small civets undoubtedly fall with the southern form which is smaller and has the upper side

of the terminal part of the tail more extensively whitish. In the absence of material from Siam representing *V. m. thai* (Kloss, Jour. Nat. Hist. Soc. Siam, 3, p. 352, 1919), no attempt has been made at any finer distinction than that between *malaccensis* and *pallida*. Geographical probabilities, however, favor the assumption that gradation between *malaccensis* and *pallida* should be found somewhere in Siam or Indo-China.

Prionodon (Pardictis) pardicolor Hodgson. SPOTTED TIGER CIVET.

Prionodon pardicolor Hodgson, Calcutta Jour. Nat. Hist., 2, p. 57, pl. 1, figs. 3, 6, 1842—Nepal.

Pardictis pardicolor presina Thomas, Proc. Zool. Soc. Lond., p. 499, 1925—Ngai Tio, Tonkin.

D. & L. 1929–30.—Chapa, T. 6.

REC. 1925–29.—Backan, T. 3; Bao Ha, T. 1; "Hanoi," T. 1 (pelt); Ngai Tio, T. 1; Xieng Kuang, L. 2.

The series from Chapa shows some variation in size and depth of color and, although comparison with the type of "*presina*" has not been made, the inference is very strong that it cannot be maintained as a highland race. The specimens at hand have the throat, chest and inner sides of the legs rich ochraceous buff. Measurements of three adult males are: total length 350, 370, 372; tail 350, 335, 360; hind foot 62, 65, 62. Condylo-basal length of an adult male skull is 71.6.

Chrotogale owstoni Thomas. OWSTON'S CIVET (Plate XI, facing p. 220).

Chrotogale owstoni Thomas, Proc. Zool. Soc. Lond., p. 500, 1912—Yen Bai, Songkoi River, Tonkin; ibid., p. 499, 1925; ibid., pp. 47–48, pls. 1, 2, 1927.

K.-R.—Muong Moun, T. 1.

D. & L. 1929–30.—Chapa, T. 2.

REC. 1925–29.—Nganson, T. 1; Thai Nien, T. 1 (pelt); "Tonkin," 4 (pelts); Xieng Kuang, L. 2 (1 pelt).

With the exception of the type, the specimens above listed include all known examples of this rare and interesting civet. The one from Muong Moun obtained by R. E. Wheeler is the first fully adult specimen with complete skin and perfect skull to be examined. Flesh measurements are: total length 1,010; tail vertebrae 490; hind foot 91. Skulls (♂ and ♀): greatest length 118.3, 105.2; condylo-basal length 114, 102.3; palatal length 56.9, 51.8; zygomatic width

51.6, 50.3; interorbital constriction 15.9, 15.4; width of braincase 36.7, 34.9; median length of nasals 31, 26.5; width between audital bullae 11.6, 10.9; last molar to foramen magnum 53.8, 51; upper toothrow including canine 42.6, 36.5; space between canine and outer incisor 6, 5.9; width across outer incisors 14.4, 11.9; lower toothrow including canine 47.1, 40.9.

The two specimens from Chapa are male and female and very old with worn teeth and highly developed sagittal crests extending the entire length of the crania. In the male skull the audital bullae are extraordinarily reduced in size, being at least a third smaller than those in the mature skull from Muong Moun.

A feature of color not mentioned by Thomas is a narrow mid-ventral line of rich ochraceous extending from the breast to the inguinal region. The two dark markings on the upper side of the proximal part of the tail are essentially repetitions of the transverse markings of the back. They are confined to the top and sides of the tail and are not completed below. The terminal two-thirds of the tail is black all around.

The labels of both the specimens collected by Willoughby Lowe carry the notation that the stomachs contained earthworms. Although meager, this information is welcome as being the first intimation of the animal's habits which may have some relation to its peculiar dentition.

Cynogale bennetti Gray. WEB-FOOTED CIVET.

Cynogale bennettii Gray, Proc. Zool. Soc. Lond., p. 88, 1836—Sumatra.

REC. 1925–29.—Backan, T. 1.

Paradoxurus hermaphroditus laotum Gyldenstolpe. COMMON PALM CIVET.

Paradoxurus hermaphroditus laotum Gyldenstolpe, Kungl. Svensk. Vet. Akad. Handl., 57, No. 2, p. 26, 1917—Chieng Hai, Siam.

Paradoxurus birmanicus Wroughton, Jour. Bomb. Nat. Hist. Soc., 25, p. 51, 1917—Mingun, near Sagaing, Upper Burma.

K.–R.—Saigon, C.C. 2.

D. & L. 1929–30.—Chapa, T. 1; Huê, A. 1; Kratie, C. 1; Lao Bao, A. 1.

DEL. 1931–32.—Thateng, L. 4.

REC. 1925–29.—Huê, A. 3; Kontoum, A. 1; Quangtri, A. 2; Tay Ninh, C.C. 2.

Among these specimens, several have no skulls and others are immature. Variation in size of teeth and audital bullae is considerable and identification is doubtful. Those from Cochin China should perhaps be referred to *cochinensis* (Schwarz, Ann. Mag. Nat. Hist., (8), 7, p. 635, 1911), but the relation of this to *minor* and *ravus* is not clear and variation is so great that without comparable material representing all the names proposed, there is little to be gained by attempts to identify individual specimens. One adult from Huê seems indistinguishable from *ravus*, and it is evident that the presence of black on the crown can be of significance only when applied as an average. The specimen from Chapa is a small female, rather more fulvous in color than usual. G. M. Allen has recently referred specimens from Hainan to *laotum*, a name which takes precedence over *birmanicus* used by Wroughton and Thomas. *P. exitus* Schwarz, from the vicinity of Canton, China, is still earlier and, since it was based on a single skull, there is little to show how *laotum* may differ from it.

Paradoxurus crossi Gray.

Paradoxurus crossi Gray, Proc. Zool. Soc. Lond., p. 66, 1832—Nepal.

D. & L. 1929–30.—Lung Lunh, A. 1.

A single specimen, not fully mature, may be referred provisionally to this species although it has not been compared with Indian material. Except for its dark tail, feet, and slight head markings, it is uniformly dull and faintly grizzled whitish without any suggestion of spots or stripes.

Arctogalidia leucotis Horsfield. WHITE-EARED PALM CIVET.

Paradoxurus leucotis Horsfield, Cat. East Ind. Mus., p. 66, 1851—Tenasserim.

DEL. 1931–32.—Paleng, L. 1; Thateng, L. 2.

REC. 1925–29.—Xieng Kuang, L. 1.

These appear to furnish the only records of this species from Indo-China.

Arctictis binturong Raffles. BINTURONG.

Viverra binturong Raffles, Trans. Linn. Soc. Lond., 13, p. 253, 1822—Sumatra.

REC. 1925–29.—"Tonkin," 1.

Paguma larvata H. Smith. MASKED PALM CIVET.

Gulo larvatus H. Smith, Griffith's Anim. King., 2, p. 281, pl., 1827—no locality.

Paguma larvata Thomas, Ann. Mag. Nat. Hist., (8), 3, p. 377, 1909; G. M. Allen, Am. Mus. Novit., No. 359, p. 5, 1929—lower Yangtze Valley.

Paguma larvata rivalis Thomas, Ann. Mag. Nat. Hist., (9), 8, p. 618, Dec., 1921—Ichang on the Yangtze, southeastern Szechwan.

K.-R.—Baurong, Szechwan 1; Mouping, Szechwan 1.

G. M. Allen, after studying a large amount of material, has recently concluded that only two continental races of *P. larvata* are recognizable. These are *larvata* of central China, paler and more generally grayish, and *intrudens* of southwestern China, Burma, and Tonkin, darker and more rufescent. If this be correct, extremes of paleness might be expected in western Szechwan and of rufescence in Tonkin. This seems to be the case and specimens from Fukien, while doubtless referable to *larvata*, are perhaps somewhat intermediate.

The specimen from Mouping, which is the northernmost yet recorded, is very light-colored, especially on the sides where it is more silvery than any other specimen examined. The upper side of its tail is entirely black and this extends a short distance on the back. It agrees fairly well with the type of *rivalis* except in its tail which is unique. The type has the tail wholly light-colored, but the tip is missing. A topotype in bad condition has about two-thirds of the tail black and another specimen from Sui Ling, near Chungking, has a tail with the usual proportion of black. It is evident, therefore, that there may be much variation in markings and, although specimens from the upper Yangtze probably average paler than those from Fukien and the lower Yangtze, they are collectively separable from *intrudens* on the basis of paler color and further division seems unnecessary.

Paguma larvata intrudens Wroughton. SOUTHERN MASKED PALM CIVET.

Paguma larvata intrudens Wroughton, Jour. Bomb. Nat. Hist. Soc., **19**, p. 793, 1910—near Myitkyina, Upper Burma.

Paguma larvata yunalis Thomas, Ann. Mag. Nat. Hist., (9), 8, p. 617, Dec., 1921—Yen-Yuen-Sian, southern Szechwan.

K.-R.—Lai Chau, T. 1; Muong Moun, T. 1; Muong Mo, T. 1; Nguluko, Yunnan 1.

D. & L. 1929–30.—Chapa, T. 4; Huê, A. 1.

DEL. 1931–32.—Paleng, L. 1.

REC. 1925–29.—Backan, T. 1; Napé, L. 3; Xieng Kuang, L. 3.

The masked palm-civet of central Tonkin has been recorded by Thomas under the name *yunalis*, but this, as concluded by G. M. Allen (Am. Mus. Novit., No. 359, pp. 4–8, July, 1929), seems to be a synonym of *intrudens*. Yunnan specimens are essentially similar

to those from Tonkin although the usual minor variations are present. One of the Tonkin specimens is more grayish than the others and perhaps may be an indication of a slight dimorphism which would account for some of the wide variation recorded for the species. In this specimen, instead of cinnamon rufous, the back and the proximal part of the tail are olivaceous gray, somewhat the shade called by Ridgway Buffy Brown. The under parts are dull whitish instead of buffy. This specimen, therefore, is very similar to *larvata* from Fukien, whereas *intrudens* is usually more rufescent. In one example the nuchal white is expanded into a broad patch with scarcely any black between it and the cinnamon rufous of the back. In two others, this white is reduced to a narrow line surrounded by pure black, this latter extending to the interscapular region.

One individual, which externally appears quite as mature as the others, still retains its milk teeth, all of which have the crowns badly worn, indicating either that the teeth are retained for an unusually long time or that some exceptionally abrasive food is habitually taken.

Paguma larvata vagans (Kloss, Jour. Nat. Hist. Soc. Siam, 3, p. 73, 1918) from Siam has not been examined.

Herpestes urva Hodgson. CRAB-EATING MONGOOSE.

Gulo urva Hodgson, Jour. As. Soc. Beng., 5, p. 283, 1836—Nepal.

DEL. 1931–32.—Thateng, L. 1.

REC. 1925–29.—Backan, T. 10; Langson, T. 1; Phuqui, A. 2; Xieng Kuang, L. 2.

Herpestes exilis Gervais. ANNAM MONGOOSE.

Herpestes exilis Gervais, Voy. Bonite, 1, p. 32, pl. 3, figs. 7–9, 1841—Tourane, Annam.

K.–R.—Phouc Mon, Quangtri, A. 5.

D. & L. 1929–30.—Huê, A. 1.

REC. 1925–29.—Col des Nuages, A. 1; Huê, A. 3; Thula-hun, A. 2.

These show considerable variation and one specimen has the ferruginous of the head continued down the middle of the back to the base of the tail.

Charronia flavigula Boddaert. INDIAN MARTEN.

Mustela flavigula Boddaert, Elench. Anim., p. 88, 1785—northern India.

DEL. 1931–32.—Thateng, L. 1.

REC. 1925–29.—Dakto, A. 1; Huê, A. 1; Kontoum, A. 1.

Mustela kathiah Hodgson. YELLOW-BELLIED WEASEL.

Mustela (Putorius) kathiah Hodgson, Jour. As. Soc. Beng., 4, p. 702, 1835—Nepal.

K.–R.—Lieng San, T. 1; Muong Mo, T. 1; Phong Saly, L. 1.
D. & L. 1929–30.—Chapa, T. 5.
REC. 1925–29.—Xieng Kuang, L. 1.

No distinction appears between Indo-Chinese specimens and others from Nepal and Sikkim. Most of the specimens in the British Museum are females or without measurements. Collector's measurements of males and females of maximum size are, respectively: total length 487, 337; head and body 292, 207; tail 195, 130; hind foot 48, 35.

A specimen from Fukien, referred by G. M. Allen to *kathiah*, is much paler than Indian material, and if it has the normal color for that region it may be possible to recognize Matschie's *melli* or Milne-Edwards's *astutus*.

Mustela sibirica moupinensis Milne-Edwards. MOUPING WEASEL.

Putorius moupinensis Milne-Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, 7, p. 92, 1870—Mouping, Szechwan.

K.–R.—Baurong, Szechwan 1 (pelt); Tupakeo, Szechwan 1; Tiyu, Gomba, Szechwan 1.

An adult female taken Sept. 9 is still in summer pelage. Comparison with a specimen from Sikkim representing *subhemachalana* shows only such differences as might be of subspecific importance. The locality Tupakeo is only a few miles north of Mouping, so the specimen from there may be taken as topotypical.

Mustela strigidorsa Gray. STRIPED WEASEL.

Mustela strigodorsa "Hodgson," Gray, Proc. Zool. Soc. Lond., p. 191, 1853—Sikkim.

K.–R.—Phong Saly, L. 1.

This is an adult female agreeing in every respect with the type which also is a female. Collector's measurements are: total length 436; tail 150; hind foot 49. Besides the type, there are in the British Museum four other specimens of this rare weasel, two from Sikkim, one from Nepal, and one from Upper Burma. The only other preserved specimen of which there is record seems to be that listed by Thomas from Thagata, Tenasserim (Ann. Mus. Civ. Stor. Nat. Gen., (2), **10**, p. 10, 1892).

Lutra tarayensis Hodgson. SMOOTH INDIAN OTTER.

Lutra tarayensis Hodgson, Jour. As. Soc. Beng., 8, p. 319, 1839—Terai, Nepal.

WULSIN 1924.—Mekong River, L. 1.

DEL. 1931–32.—Pakse, L. 1; Thateng, L. 9 (6 alc.).

REC. 1925–29.—Xieng Kuang, L. 1.

This appears to be the most common otter of the Mekong. The specimens are mostly immature, eight being newly born young.

Lutra sumatrana Gray. HAIRY-NOSED OTTER.

Lutra sumatrana Gray, Proc. Zool. Soc. Lond., p. 125, fig., 1865—Sumatra.

REC. 1925–29.—"Annam," 2.

Lutra lutra chinensis Gray. COMMON OTTER.

Lutra chinensis Gray, Mag. Nat. Hist., (2), 1, p. 280, 1837—southeastern China.

K.-R.—Phong Saly, L. 1.

D. & L. 1929–30.—Chapa, T. 2; Hoi Xuan, A. 1; Huê, A. 1.

A partly grown otter from Laos belongs to the *lutra* series and probably should be referred to *L. l. chinensis*, a name recently used by G. M. Allen for specimens from Hainan and Fukien. Others from Tonkin and Annam, nearly adult, are rather small and characterized by white or buffy white chins. A female from Hoi Xuan has the entire interramial region and anterior throat nearly pure white to the roots of the hairs. Its skull has a condylo-basal length of 100 and zygomatic width of 68.8.

Aonyx cinerea Illiger. CLAWLESS OTTER.

Lutra cinerea Illiger, Abhandl. Akad. Berlin, (1811), p. 99, 1815—Batavia, Java.

K.-R.—Lao Bao, A. 1.

DEL. 1931–32.—Thateng, L. 1.

A fine adult female obtained by Coolidge is in the collection. A somewhat younger female was taken by Delacour in Laos.

Meles meles leucurus Hodgson. ASIATIC BADGER.

Taxidea leucura Hodgson, Jour. As. Soc. Beng., 16, p. 763, pls. 29–31, 1847—region of Lhasa, Thibet.

K.-R.—Near Hlagong, district of Tatsienlu, Szechwan 1.

A badger obtained by Stevens in the highlands of northwestern Szechwan is perhaps best referred to under the name *leucurus*.

Whether this differs from *leptorynchus*, recently used by G. M. Allen for Chinese badgers, may not be certain, but *leucurus*, having priority, will stand for some Asiatic form unless for other reasons it should be unavailable. Anderson (Yunnan Exped., 1, p. 197, 1878) states that he has compared the types of *leucurus*, *leptorynchus*, and *chinensis* without finding significant distinctions.

Arctonyx collaris F. Cuvier. HOG BADGER.

Arctonyx collaris F. Cuvier, Hist. Nat. Mamm., part 51, 2 pp., pl., 1825—Bhutan.

K.–R.—Tiyu, Gomba, Szechwan 1 (pelt).

A hunter's skin without skull from southwestern Szechwan may be referred to this species which G. M. Allen regards as ranging over all of southern China.

Arctonyx collaris dictator Thomas. SIAMESE HOG BADGER.

Arctonyx dictator Thomas, Ann. Mag. Nat. Hist., (8), 5, p. 424, 1910—Trang, lower Siam.

?*Arctonyx annaeus* Thomas, Ann. Mag. Nat. Hist., (9), 7, p. 524, 1921—Nhatrang, Annam.

K.–R.—Phong Saly, L. 2.

DEL. 1931–32.—Thateng, L. 4.

A complete skin and skull and an additional hunter's skin are in the collection. These agree in large size with *A. dictator* as described but differ from each other quite markedly in color. Collector's measurements of an adult male are: total length 909; tail 234; hind foot 126. Skull: greatest length 168; condylo-basal length 155; zygomatic width 87.2; least interorbital width 34.4; greatest diameter of upper molar 17.

Under the name *annaeus*, an immature specimen has been described from Nhatrang, Annam, and a skin without skull is recorded from Phuqui, Annam. No conclusive evidence is presented to distinguish them from *dictator*, and until this is forthcoming it seems best to consider the name *annaeus* of doubtful status. Specimens from southern Laos are fully as large as northern ones.

Helictis moschata ferreo-grisea Hilzheimer. CHINESE FERRET BADGER.

Helictis ferreo-griseus Hilzheimer, Zool. Anz., 29, p. 298, 1905—Hankau, Hupeh, China.

K.–R.—Baurong, Szechwan 1 (pelt).

A hunter's skin without skull obtained by Stevens is tentatively referred to this form which G. M. Allen has regarded as occupying a considerable range in China. It is somewhat paler and more hoary than specimens from Fukien and its ears are entirely light-colored instead of being darker behind.

Helictis taxilla Thomas. TONKIN FERRET BADGER.

Helictis taxilla Thomas, Proc. Zool. Soc. Lond., part 2 (1925), p. 500, July, 1925—Ngai Tio, Tonkin.

K.–R.—Phong Saly, L. 5.
D. & L. 1929–30.—Chapa, T. 15.
REC. 1925–29.—Ngai Tio, T. 2; Xieng Kuang, L. 8.

In this large series the extent and arrangement of the white markings about the head are fairly constant. In a few the brown spot behind the eye is almost entirely wanting, and in others the white on the cheeks is considerably reduced. The color of the under parts is more variable, the extent of pale, or ochraceous, self-colored hairs ranging from one in which the entire under parts and the front sides of the fore and hind legs are included to others in which the legs are wholly dark all around and in which the color of the sides invades the under parts almost to the midventral line. In several a prominent white spot is developed on each side of the front of each hind leg near its junction with the body. Measurements of five males as taken by the collector are as follows: total length 464 (437–504); tail 143.4 (131–151); hind foot 59.2 (58–62).

Helictis (Melogale) personata laotum Thomas. BURMESE FERRET BADGER.

Melogale personata laotum Thomas, Ann. Mag. Nat. Hist., (9), 9, p. 194, Feb., 1922—Nan, Siam.

?*Melogale tonquinia* Thomas, supra cit., p. 195—Yen Bai, Songkoi River, Tonkin.

K.–R.—Phouc Mon, Quangtri, A. 2.
D. & L. 1929–30.—Huê, A. 2.
DEL. 1931–32.—Thateng, L. 5.
REC. 1925–29.—Huê, A. 5; Kontoum, A. 1.

Three of these are fine adults which agree in measurements with those given for the subspecies *laotum*. In the original description, Thomas suggested this form might range into Annam.

The status of *H. tonquinia*, which was based on a single immature female, seems doubtful. There is considerable variation in

the size of the teeth of specimens from one region, but the teeth in the type of *tonquinia* are exceeded in size by all other available specimens.

As suggested by Allen (Am. Mus. Novit., No. 358, p. 6, 1929), the recognition of *Melogale* as a full genus seems inadvisable, such a course being only a means of obscuring obviously close relationships. The characters of the baculum adduced by Thomas probably need further confirmation. In these specimens taken at the same time and place, the baculum is bifid in one case and trifid in the other or at least with a definite third protuberance.

Helictis (Melogale) personata pierrei Bonhote.

Helictis pierrei Bonhote, Ann. Mag. Nat. Hist., (7), **12**, p. 592, 1903—Saigon, Cochin China.

REC. 1925–29.—Djiring, A. 1.

In recording the specimen from Djiring, Annam, under this name, Thomas (1928, p. 146) says, "Whether *pierrei* is really different from *personata* remains to be seen." The same is probably true as to whether or not *laotum* differs from *pierrei* and, although material representing *laotum* is now abundant, that of *personata* and *pierrei* is still scanty.

Cuon rutilans Müller. WILD DOG.

Canis rutilans Müller, Verhandl. Zool. Zoogd., pp. 27, 51, 1839—"Bengal."

K.–R.—Saigon, C.C. 1.

D. & L. 1929–30.—Kontoum, A. 1.

DEL. 1931–32.—Thateng, L. 1.

REC. 1925–29.—Backan, T. 1 (pelt).

Vulpes vulpes subsp. COMMON FOX.

K.–R.—"Szechwan," 1 (pelt).

This probably represents Matschie's *aurantioluteus*, but a series of specimens will be necessary to determine its proper status.

Nyctereutes procyonoides Gray. RACCOON DOG.

Canis procyonoides Gray, Illus. Ind. Zool., **2**, pl. 1, 1834—southeastern China.

REC. 1925–29.—Langson, T. 2.

Helarctos malayanus Raffles. MALAY BEAR.

Ursus malayanus Raffles, Trans. Linn. Soc. Lond., **13**, p. 254, 1822—Sumatra.

K.–R.—Lao Fou Chai, L. 1 (skull).

DEL. 1931–32.—Thateng, L. 1 (juv.).

REC. 1925–29.—Huê, A. 1; Quangtri, A. 1.

The skull of an exceptionally large male was obtained in Laos by Coolidge. This has a zygomatic width of 223 mm. (8.75 inches) and the estimated basal length is about the same. This is perhaps the maximum size for the species since the largest skull examined by Blanford is recorded as "8.5 inches long (basal length) and 8.3 broad."

Selenarctos thibetanus subsp. HIMALAYAN BLACK BEAR.

K.–R.—Lao Fou Chai, L. 2 (skulls).
D. & L. 1929–30.—Huê, A. 1 (skull).

These unsexed skulls appear to be about the same size as others recorded from northern India and they scarcely can be referred to *melli* of Fukien, which is supposed to be much smaller. The upper molar in two skulls measures 27–28 mm. in length.

Ailurus fulgens styani Thomas. SMALL PANDA.

Ailurus fulgens styani Thomas, Ann. Mag. Nat. Hist., (7), **10**, p. 251, 1902—Yang-liu-pa, northwestern Szechwan.

K.–R.—Baurong, Szechwan 1 (pelt); Tiyu, Gomba, Szechwan 1 (pelt); Wushi, Szechwan 1 (pelt).

Three hunter's skins, purchased by Stevens, are practically complete but without skulls or measurements. They exhibit considerable variation in color apparently due mainly to season. One which is doubtless in unworn winter coat is very rich and dark, the entire median upper parts and the lighter annulations of the tail Mahogany Red to Chestnut. The dark annulations of the tail and a broad tip are black. In another, more worn, the head and shoulders are still Chestnut but the darker annulations of the tail and the remaining upper parts are Cinnamon Rufous to Hazel. The lighter annulations of the tail are Ochraceous Buff and the narrow tip brownish. A third, still more worn, has the lighter rings of the tail Light Buff, almost whitish.

Ailuropoda melanoleuca David. GIANT PANDA.

Ursus melanoleucus David, Nouv. Arch. Mus. Hist. Nat., Paris, **5**, Bull., p. 13, 1869—Mouping, Szechwan.

Ailuropoda melanoleuca Milne-Edwards, Ann. Sci. Nat., Paris, (5), Zool., **13**, art. 10, 1870.

Ailuropus melanoleucus Milne-Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, **7**, Bull., p. 92, 1871; Rech. Mamm., pp. 321–328, pls. 50–60, 1873.

K.-R.—Yachow district, Szechwan 1 (skin and skull); Yehli district, Szechwan 6 (1 skin and skeleton, 5 pelts).

As variously announced elsewhere, the crowning exploit of the Kelley–Roosevelts Expedition was the trailing and shooting of a giant panda by the brothers Theodore and Kermit Roosevelt. This took place April 13, 1929, in the Yehli district of southwestern Szechwan. The skin of the animal and the complete skeleton were carefully preserved and reached Field Museum in excellent condition. Besides the skin of the one shot by themselves, the Roosevelts were able by purchase or barter to obtain from native sources several additional skins, mostly bereft of feet and claws and otherwise somewhat imperfect but of much value for comparative purposes. One of these served as a companion piece with the perfect one in making a habitat group which has been installed in William V. Kelley Hall of Field Museum. Since the return of the Roosevelts a further complete skin with skull and leg bones has been received by Field Museum. This was obtained at the instance of the Roosevelts by L. R. Crook of Yachow, Szechwan.

The following notes on the habits and distribution of the animal have been published by the Roosevelts.[1] "The natives know him as the *beishung* or white bear. To the best of our judgment he has a fairly wide area of distribution but is to be found only in pockets, and is never abundant even in these pockets. He lives in bamboo jungles in altitudes varying between six and fourteen thousand feet. We came to the conclusion that where there were no bamboo jungles, there were no beishung. . . . Where he actually exists, his droppings are frequent and easy to find, and even easier to identify. They are egg-shaped, from five to seven inches in length (for the adult) and composed of partially digested bamboo shoots. The Muping and Yehli districts were the only places where, after diligent and unceasing inquiry throughout the trip, we could be convinced of the presence of the giant panda. . . .

"The beishung does not hibernate. We found fresh signs in regions where the brown and black bears were hibernating, and the one we shot was living in a locality where the black bears had not yet awaked from their winter's nap. We came upon his tracks one morning in the newly fallen snow. They were partly obliterated, for four or five hours had passed since he went by. Three hours' trailing through dense jungle brought us to the spot which he had

[1] Theodore and Kermit Roosevelt, Trailing the Giant Panda, Charles Scribner's Sons, New York, 1929.

selected for his siesta. We caught sight of him emerging from the hollow bole of a giant fir tree, and fired simultaneously."

The complete skeleton of *Ailuropoda* included in this collection is especially deserving of a thorough study which doubtless will throw further light on the relationships of the animal. Superficial observations, therefore, are deferred until such a study can be made.

Petaurista lylei badiatus Thomas. BAY FLYING SQUIRREL.

Petaurista lylei badiatus Thomas, Proc. Zool. Soc. Lond., p. 501, 1925—Ngai Tio, Tonkin.

K.-R.—Muong Boum, T. 1; Muong Moun, T. 2; Tuan Gao, T. 2.
D. & L. 1929–30.—Chapa, T. 5.
DEL. 1931–32.—Phukong Ntoul, L. 1.
REC. 1925–29.—Dalat, A. 1; Ngai Tio, T. 3; Phuqui, A. 1; Xieng Kuang, L. 1.

Two magnificent specimens have the following measurements, taken by the collector: total length 1,125, 1,025; tail 635, 580; hind foot 94, 90.5. The largest skull has the occipito-nasal length 80.2.

No comparison has been made with typical *lylei* from neighboring localities in northern Siam.

Petaurista annamensis Thomas. ANNAM FLYING SQUIRREL.

Petaurista annamensis Thomas, Jour. Bomb. Nat. Hist. Soc., 23, p. 204, 1914—Bali, near Nhatrang, Annam.

REC. 1925–29.—Kontoum, A. 1; Tay Ninh, C.C. 3.

This is regarded by Thomas as a distinct species occurring in the same region with *badiatus*, but the characters assigned to it seem very slight and likely to be subject to variation.

Petaurista marica Thomas. SPOTTED FLYING SQUIRREL.

Petaurista marica Thomas, Ann. Mag. Nat. Hist., (8), 9, p. 687, 1912—near Mongtze, Yunnan.

D. & L. 1929–30.—Chapa, T. 1.
REC. 1925–29.—Xieng Kuang, L. 1.

Pteromys (Hylopetes) alboniger Hodgson. BLACK AND WHITE FLYING SQUIRREL.

Sciuropterus alboniger Hodgson, Jour. As. Soc. Beng., 5, p. 231, 1836—Nepal.

K.-R.—Muong Moun, T. 1.

REC. 1925–29.—Dakto, A. 4; Djiring, A. 1; Huê, A. 1; Kontoum, A. 2.

DEL. 1931–32.—Pakse, L. 1.

The specimen from Tonkin agrees closely with examples from Hodgson's original series. It is a small female and somewhat smaller than others from Annam previously recorded by Thomas.

Pteromys (Hylopetes) spadiceus Blyth. BROWNISH FLYING SQUIRREL.

Sciuropterus spadiceus Blyth, Jour. As. Soc. Beng., **16**, p. 867, pl. 36, fig. 1, 1847—Arakan, India.

REC. 1925–29.—Kontoum, A. 1.

DEL. 1931–32.—Paleng, L. 1; Thateng, L. 2.

Belomys pearsoni blandus subsp. nov.

Type from Muong Moun, south of Lai Chau, Tonkin. No. 32,312 Field Museum of Natural History. Adult male. Collected March 16, 1929, by J. Van Tyne. Orig. No. 32.

Diagnosis.—Similar to *B. pearsoni* of Sikkim, but smaller, with decidedly smaller teeth and shorter, broader nasals. Similar to *B. trichotis* but with rufescent instead of white under parts.

Color.—Practically as in *B. pearsoni*, rich ochraceous shades prevailing throughout.

Skull.—Markedly smaller than in *pearsoni*, slightly smaller than in *trichotis;* nasals broad, scarcely diminishing in width posteriorly; teeth relatively small.

Measurements.—Type, measured in flesh by collector: total length 373; tail 180; hind foot 38. Skull: greatest length 41.5; basilar length 34.5; zygomatic breadth 24.7; mastoid breadth 21.5; length of nasals 11.5; breadth of nasals behind 4.5; upper toothrow 8.9 (10.1 in *pearsoni*).

Remarks.—This is doubtless only a slight western form of *B. pearsoni*. A specimen from Bao Ha, Tonkin, in the British Museum is without skull or measurements and was recorded by Thomas (1925, p. 501) with no specific designation. Comparison has been made with two specimens in the British Museum from Sikkim and Assam, representing *pearsoni*, and two from Chindwin, Burma, representing *trichotis*. The new form seems to agree with *pearsoni* in color, while in size and cranial characters it is nearer to *trichotis*.

B. kaleensis of Formosa is closely similar in color, but in this also the teeth are large.

Specimens examined.—Chapa, T. 1 (D. & L. 1929–30); Muong Moun, T. 1 (K.–R.).

Ratufa bicolor smithi Robinson and Kloss. SMITH'S GIANT SQUIRREL.

Ratufa bicolor smithi Robinson and Kloss, Ann. Mag. Nat. Hist., (9), 9, p. 89, 1922—Langbian Peaks, Annam.

REC. 1925–29.—Djiring, A. 3; Tay Ninh, C.C. 2.

Ratufa melanopepla leucogenys Kloss. WHITE-CHEEKED GIANT SQUIRREL.

Ratufa melanopepla leucogenys Kloss, Proc. Zool. Soc. Lond., p. 43, 1916—Lem Ngop, southeastern Siam.

REC. 1925–29.—Sambor, C. 1.

Ratufa gigantea McClelland. GIANT SQUIRREL.

Sciurus giganteus McClelland, Proc. Zool. Soc. Lond., p. 150, 1839—Assam, India.

K.–R.—Near Lao Fou Chai, L. 1; Muong Yo, L. 2; Phong Saly, L. 1.

D. & L. 1929–30.—Boloven, L. 1; Chapa, T. 2; Hoi Xuan, A. 1.

DEL. 1931–32.—Banphone, L. 2; Bantion, L. 1; Thateng, L. 3.

REC. 1925–29.—Napé, L. 4; Phuqui, A. 8; Tam Dao, T. 5; Xieng Kuang, L. 1.

As compared with a series from Sikkim, Indo-Chinese specimens show no pronounced difference in color, but their skulls are characterized by various minor peculiarities including darker-colored incisors, narrower nasals, and larger, higher, audital bullae. Since no material from Assam or Hainan is at hand, the determination of the subspecific status of these specimens has not been attempted.

Callosciurus erythraeus hendeei subsp. nov. HENDEE'S TONKIN SQUIRREL.

Type from Chapa, Tonkin. No. 32,290 Field Museum of Natural History. Adult male. Collected Feb. 14, 1929, by Russell W. Hendee. Orig. No. 5,168.

Diagnosis.—Similar to *C. e. castaneoventris* of Hainan, but larger and darker, the feet more blackish, the ears more ochraceous, and

the fore legs and facial region paler grayish. Similar to *C. e. nagarum* of Assam but coloration throughout slightly darker and more intense, the feet with intense black toes instead of merely sooty, the outer sides of the ears more definitely ochraceous, and the back less uniform. Similar to *C. e. gordoni* but less brownish in color throughout and usually without a midventral stripe.

Color.—Upper parts finely grizzled throughout usually producing a general olivaceous effect; middle of back varying from a color practically like that of the sides to a concentration of brownish or blackish which in extreme cases takes the form of a definite dark median line from the shoulders to the rump; outer sides of fore and hind legs slightly more grayish than body; sides of face and chin rather more grayish than surrounding parts; under parts clear deep ferruginous (Mahogany Red of Ridgway), rarely with traces of a grizzled median stripe on chest; feet and hands proximally blackish with a fine speckling of gray, distally intense clear black including all of toes; ears grizzled within, pale buffy ochraceous without or even whitish in rather sharp contrast to surrounding pelage; tail with the hairs having three to four broad bands of black alternating with pale whitish to ochraceous light bands, the terminal band being light and in fresh condition dominating the color of the entire tail. The subterminal band on the tail hairs is much broader than the others and gradually widens toward the tip where it finally extends to the roots of the hairs and may, when the terminal light band is worn away, produce a long wholly black brush at the end of the tail.

Skull.—Smaller throughout than in *castaneoventris* and *ningpoensis*.

Measurements.—Type: total length 437; tail 213; hind foot 55. Skull of type: greatest length 55; condylo-basal length 51; zygomatic width 32.6; interorbital width 28.8; upper toothrow 10.2.

Remarks.—A study of the entire group to which it belongs has been necessary before coming to the conclusion that this squirrel from Tonkin and Laos should be named. In 1925, when Thomas first reported on mammals from Tonkin, he referred specimens from Thai Nien and Bao Ha to *castaneoventris*, a species described by Gray from a specimen collected by Reeves in China and having no exact locality. Robinson and Kloss (Rec. Ind. Mus., **15**, p. 199, 1918) had previously expressed the opinion that Gray's type could not be distinguished from the squirrel of the island of Hainan named *insularis* by Allen (Bull. Am. Mus. Nat. Hist., **22**, p. 473, 1906).

Therefore, they proposed that Hainan be accepted as the type locality of *castaneoventris* and that *insularis* fall as a synonym. Thomas, finding his Tonkin specimens very similar to others from Hainan, agreed with Robinson and Kloss as to the disposition of *insularis*, but not as to the type locality of *castaneoventris* which he thought more likely to be the "mainland of southwestern China, more or less in the region of Canton." A reexamination of the subject with large series from both Tonkin and Hainan leads me to agree, at least for the present, with Robinson and Kloss rather than with Thomas, whose material from Hainan in the British Museum was very scanty and inconclusive.

Gray's type of *castaneoventris* is an old specimen considerably shrunken, but apparently not much altered in color. It cannot be distinguished in any way from Hainan specimens, whereas it differs from the Tonkin form in the various characters enumerated above, including size, color of feet, ears, facial region, etc. The whitish-tipped tail appears to be of less importance for distinguishing the Hainan form than these other characters, for both whitish and ochraceous tails are found on the mainland. The type does agree with the Tonkin form in the color of the under parts, however, and in this respect it differs from specimens from the mainland of China in the Fukien region which are somewhat more richly colored than those called *ningpoensis* from farther north. No specimens have been examined from the region between Fukien and Tonkin, and it is quite possible or even probable that when these are obtained they will prove to have still darker under parts and furnish a better basis for the supposition of Thomas that the type came from the region of Canton. Until then it seems necessary to assume Hainan as the type locality and in any case the distinction of a separate form in Tonkin is justified.

Having distinguished the Tonkin squirrels from *castaneoventris*, it becomes necessary to consider their affinities with forms to the north and west, the chief of these being *nagarum* and *gordoni*. From *gordoni* they differ in more grayish coloration, in their light-colored contrasting ears, and in the absence of a well-defined midventral stripe. In a series of more than a hundred from Tonkin, Annam and Laos, only three show traces of a midventral stripe. These are specimens in the British Museum from Backan, Chora, and Tam Dao, eastern Tonkin, and they also show the most definite blackish dorsal stripes in the series. Slight tendency to concentration of blackish or brownish in the middorsal region appears occasionally

in specimens throughout Tonkin, a character which is doubtless variable but which has not been observed in any other subspecies of the *erythraeus* series unless *atrodorsalis* and its forms be included. In fact, these dark-backed specimens with a slight midventral line, although very much darker, are quite suggestive of *C. atrodorsalis* of northern Siam and the possibility that *atrodorsalis* and *erythraeus* may inosculate is probably still to be considered.

In one of his later papers on Indo-Chinese mammals, Thomas (1929, p. 836) refers a large series of squirrels from Phuqui, Annam, to subspecies *nagarum*, evidently being especially influenced by the black-tipped tails which are shown throughout the series. A study of these and others, however, seems to indicate that the black at the end of the tail may be exposed by the wearing away of the light tips to the hairs to such an extent that the terminal third of the tail becomes wholly black. There is variation both individual and local which may partially account for some cases, but it is certain that wear is largely responsible for it. In spite of the large number of specimens of the *erythraeus* series that are in collections, very few are available to give any range of pelage changes due to season. Nearly all collectors have worked in the dry or winter season, from December to March, and, although pelage changes may be inferred, they cannot be followed in detail. Specimens in Field Museum from northern Laos and Tonkin include some with unworn tails, having fresh light tips to the hairs and others in which the terminal part of the tail is black and evidently not in fresh condition. Also, in a large series of *gordoni* in the British Museum, all from one locality, both conditions may be seen.

The distinction of *hendeei* and *nagarum* consists mainly in the general more saturate color of the former. This extends to all parts and wherever special comparison is made is found to hold true. The under parts in *hendeei* are the Mahogany Red of Ridgway while those of *nagarum* are several shades lighter, Sanford's Brown or, at most, not stronger than Burnt Sienna. The upper parts also average paler in *nagarum* and the ears, although having light proectotes, are not so sharply marked and contrasted as in *hendeei*. In *nagarum*, the feet are grizzled to the claws, whereas in *hendeei* the toes and often the sides of the feet are intense pure black.

The *Sciurus erythraeus pranis* of Kloss, from southwestern Siam, which was later considered by its describer as allied to *atrodorsalis*, has not been seen, but the description indicates a much paler animal with a gray pectoral line.

Specimens examined.—Total number 110, from the following localities: Annam: Hoi Xuan 2;[2] Lung Lunh 3;[2] Phuqui 3,[2] 24;[3] Than Hoa 1.[2] Laos: Lao Fou Chai 1;[1] Muong Yo 2;[1] Phong Saly 5;[1] Xieng Kuang 1.[3] Tonkin: Backan 8;[3] Bao Ha 7;[3] Chapa 2,[1] 21;[2] Chora 1;[3] Isla de Table 1;[2] Langson 1;[3] Lieng San 1;[1] Muong Boum 1;[1] Muong Mo 5;[1] Nganson 3;[3] Pakha 3;[2] Tam Dao 7;[3] Thai Nien 4;[3] Ye Yen Sun 1.[1]

Callosciurus erythraeus gordoni Anderson. GORDON'S SQUIRREL.

Sciurus gordoni Anderson, Proc. Zool. Soc. Lond., p. 140, 1871—Bhamo, Upper Burma.

K.–R.—Thirty-seven miles north of Bhamo 1.

This specimen, practically a topotype, agrees with a large series in the British Museum from "Salween Divide."

Callosciurus erythraeus michianus Robinson and Wroughton. YUNNAN SQUIRREL.

Sciurus castaneiventris michianus Robinson and Wroughton, Jour. Fed. Malay States Mus., 4, p. 234, 1911—Mee Chee, Yunnan.

K.–R.—Likiang, Yunnan 1; Nui Kai (thirty miles north of Talifu) 1; Shangkuan (ten miles north of Talifu) 3.

In two of these, the gray midventral stripe is fully developed, in one it is slightly interrupted posteriorly, in another confined to the chest, and in still another it is wholly absent. There is also variation in the shade of ferruginous of the under parts. Other specimens examined from the Likiang region show similar variation and, although they are easily distinguishable from *gordoni* on the one hand and *gloveri* on the other, they seem to represent an intermediate stage between the two.

Callosciurus erythraeus gloveri Thomas. GLOVER ALLEN'S SQUIRREL.

Callosciurus erythraeus gloveri Thomas, Jour. Bomb. Nat. Hist. Soc., 27, p. 502, 1921—Nagchuka, western Szechwan.

K.–R.—Baurong, Szechwan 4; Muli, Szechwan 5; Yungning, Yunnan 2.

This form seems nearest to *michianus*, with which it agrees in general pale color, but differs in the absence of the midventral stripe.

[1] Kelley–Roosevelts Expedition.
[2] Delacour and Lowe, 1929–30.
[3] Records, 1925–29.

In the more southern specimens the ears are noticeably ochraceous and contrasted, but in those from Baurong, taken in May, the ears are gray with only faint traces of ochraceous. This may be partly seasonal or it may represent the extreme of a development from the southern forms northward.

Callosciurus erythraeus bonhotei Robinson and Wroughton. BONHOTE'S SQUIRREL.

Sciurus castaneoventris bonhotei Robinson and Wroughton, Jour. Fed. Malay States Mus., 4, p. 234, 1911—Chin Chien San, Szechwan.

K.–R.—Omei-Shan, Szechwan 1.

This is a large, dark-colored squirrel quite unlike *gloveri* and *michianus* of western Szechwan and probably more nearly related to forms of southern and eastern China. Besides the type, there are in the British Museum two other examples from Chen Yen Say and Yuen Ching Hsien, both collected by M. P. Anderson.

Callosciurus flavimanus Geoffroy.

Sciurus flavimanus Geoffroy, Mag. Zool., Classe I, Mamm., p. 1, 1832—Tourane, Annam.

REC. 1925–29.—Col des Nuages, A. 22; Huê, A. 1; Thua Lua, A. 2.

Callosciurus flavimanus quantulus Thomas.

Sciurus flavimanus quantulus Thomas, Proc. Zool. Soc. Lond., p. 51, 1927—Xieng Kuang, Laos.

K.–R.—Phouc Mon, Quangtri, A. 7.

REC. 1925–29.—Ceia Tung, Quangtri, A. 3; Xieng Kuang, L. 7.

These agree closely with specimens from Col des Nuages regarded as typical *flavimanus* by Thomas (1927, p. 51). In most of them, however, the terminal inch of the tail is either wholly black or black with a few light-tipped hairs, although one has scarcely more black at the tip of the tail than laterally. In three there is evidence of a light hip-patch, in the others none. Two have the tails annulated with black and dull whitish, while the others are much more ochraceous. In some the "maroon" of the under parts extends to the chin and in others it does not. These are among the characters used by Thomas to distinguish no less than five races of this squirrel within a district scarcely more than three hundred miles in linear extent. It is, nevertheless, entirely possible that these all may be locally distinct, since notable cases of such differentiation among squirrels

are known elsewhere. On the other hand, seasonal variation in squirrels is considerable and dimorphism frequent. The supposed races are *quantulus* (Xieng Kuang, Laos), *pirata* (Napé, Laos), *dactylinus* (Dakto, Annam), and *contumax* (Kontoum, Annam). Typical *flavimanus* is represented by a large series from Col des Nuages, the others by a half dozen specimens, each series from a single locality. Our specimens apparently stand somewhat between *quantulus* and *pirata* and similar ones have been referred by Thomas to *quantulus*.

Callosciurus flavimanus bolovensis subsp. nov.

Type from Paksong, Boloven Plateau, Laos. No. 37,874 Field Museum of Natural History. Adult female. Collected January 24, 1932, by J. Delacour. Orig. No. 211.

Diagnosis.—Similar to *C. flavimanus*, but distal part (one-fourth to three-fourths) of tail self-colored ferruginous or cinnamon rufous without annulations; base of tail with hairs light at base and with only two or, at most, three, dark annulations; sides of face and top of head largely ochraceous tawny and entire pelage more extensively rufescent than in *flavimanus* and related subspecies; hands and feet nearly as richly colored as the under parts and in some contrast to the front sides of the arms which are paler; lower legs in some cases suffused with tawny on outer sides; under parts practically as in *flavimanus;* a slight hip-patch in some specimens.

Measurements.—Type: total length 452; tail 208; hind foot 55.

Remarks.—This form is represented by twenty-four specimens in which there is some variation but in which the important characters are well maintained. Although it is probable that too many names already have been applied to the *flavimanus* group, there seems no possible disposition of these specimens except as representatives of an undescribed form. They differ from all the previously named ones more than any of them do from each other and their remarkable tails, largely self-colored, even suggest those of the *ferrugineus* group. The condition of the tails in most cases is slightly worn, indicating a pelage of long standing, and it is not unlikely that such a pelage might be succeeded by one in which at least a few annulations would be carried to the tip. Nothing closely resembling them, however, has been seen in the other forms.

Specimens examined.—Bantion, L. 1; Pakhout, L. 1; Paksong, L. 2; Thateng, L. 20.

Callosciurus flavimanus dactylinus Thomas.

Callosciurus flavimanus dactylinus Thomas, Proc. Zool. Soc. Lond., p. 52, 1927—Dakto, Annam.

REC. 1925–29.—Dakto, A. 5.

Callosciurus flavimanus contumax Thomas.

Callosciurus flavimanus contumax Thomas, Proc. Zool. Soc. Lond., p. 52, 1927—Kontoum, Annam.

REC. 1925–29.—Kontoum, A. 5.

Callosciurus flavimanus pirata Thomas.

Callosciurus flavimanus pirata Thomas, Proc. Zool. Soc. Lond., p. 836, 1929—Napé, Laos.

REC. 1925–29.—Huê, A. 1; Napé, L. 11.

Callosciurus imitator Thomas.

Callosciurus imitator Thomas, Proc. Zool. Soc. Lond., p. 502, 1905—Thai Nien, Tonkin.

K.–R.—Lieng San, T. 6; Muong Boum, T. 11; Muong Moun, T. 4; Muong Yo, L. 16; Nam Neu, south of Lai Chau, T. 1; Nong Lum, T. 1; Phong Saly, L. 3; Vientiane, L. 1.

D. & L. 1929–30.—Chapa, T. 17; Hoi Xuan, A. 2; Pakha, T. 3.

WULSIN 1924.—Lai Chau, T. 3; Muong Khoua, L. 1.

REC. 1925–29.—Muong Sen, A. 2; Napé, L. 2; Phuqui, A. 15; Thai Nien, T. 2; Xieng Kuang, L. 1.

This plain-colored squirrel evidently is very common throughout northern Laos and western Tonkin, since it was taken in much larger numbers than any other species. There is but little variation in color shown and no distinctions can be made between northern and southern specimens. The single example from Vientiane, taken July 3, indicates that the color of the under parts may be considerably lighter at that season than in winter.

Callosciurus griseimanus Milne-Edwards. GRAY-HANDED SQUIRREL.

Sciurus griseimanus Milne-Edwards, Rev. Mag. Zool., (2), **19**, p. 195, June, 1867—Saigon, Cochin China.

Macroxus leucopus Gray, Ann. Mag. Nat. Hist., (3), **20**, p. 282, Oct., 1867—Cambodia.

Sciurus leucopus fumigatus Bonhote, Abstr. Proc. Zool. Soc. Lond., p. 2, Jan. 22, 1907—Ninh Hoa, Annam.

Sciurus vassali Bonhote, Proc. Zool. Soc. Lond., p. 9, 1907—substitute for *fumigatus*, preoccupied.

Callosciurus leucopus Thomas, Proc. Zool. Soc. Lond., p. 147, 1928.

D. & L. 1929–30.—Ninh Hoa, A. 3; Phanrang, A. 3.

REC. 1925–29.—An Binh, C.C. 4; Djiring, A. 21; Tay Ninh, C.C. 9.

Although Bonhote regarded *griseimanus* and *leucopus* as distinct species and recognized two races of *leucopus*, present evidence seems to indicate that no more than one variable form is concerned. Thomas (l.c.) has noted great variability in an extensive series from Djiring, Annam, on the basis of which he discredits *vassali*, but he does not mention *griseimanus*. In the Delacour and Lowe collection of 1930 are six specimens obtained by Jabouille, three from Ninh Hoa and three from Phanrang, both localities in the same general region as Djiring. Those from Ninh Hoa, which is the type locality of *vassali*, show all the characters of *griseimanus*, while those from Phanrang, taken at another season, represent the other extreme of coloration supposed to characterize *leucopus*. The Ninh Hoa specimens, taken in September, are darker and have the under parts rich ferruginous in great contrast to the upper parts. Those from Phanrang, taken in July, are generally paler and the under parts are merely pale buffy blending on the sides with the upper parts. Although these differences are very pronounced, it seems highly probable that they are due mainly to a seasonal change and the variation between the extremes which has been recorded previously may be accountable as stages from one to the other.

The names *griseimanus* and *leucopus* were published in the same year, the former apparently having priority of a few months.

Callosciurus ferrugineus williamsoni Robinson and Kloss. WILLIAMSON'S SQUIRREL.

Callosciurus ferrugineus williamsoni Robinson and Kloss, Ann. Mag. Nat. Hist., (9), 9, p. 90, Jan., 1922—Khet Don Heing, Paklai-loop, north bank Mekong River, Laos.

K.-R.—Vientiane, L. 7.

DEL. 1931–32.—Pakse, L. 5.

The small series of this handsome squirrel from Vientiane is quite uniform in coloration and, since the locality is not very far from that of the original series, is quite typical in all respects. Direct comparison with the type, now in the British Museum, finds agreement as to color, although the type was taken in January and

the Vientiane specimens in July. The type merely has somewhat heavier pelage.

This squirrel furnishes an instance of the rather unusual coloration (at least in certain pelages) in which the under parts are darker and more deeply colored than the upper parts. Its nearest ally is doubtless the Siamese *menamicus* from which it differs in generally brighter color above and in the sharp demarcation of upper and lower parts.

The specimens from Pakse in general are more deeply colored than those from farther north and the tails are no lighter at the tips than elsewhere. It is probable, however, that such differences are due largely or wholly to season. Apparently the form has quite an extensive north and south range along the east bank of the Mekong. The occurrence of *annellatus* on the west side of the river and *williamsoni* on the east side practically opposite indicates that there is no connection between them at this point.

Callosciurus ferrugineus splendens Gray.

Sciurus splendens Gray, Proc. Zool. Soc. Lond., p. 137, 1861—S. Cambodia (Thomas, 1929).

REC. 1925–29.—Bokor, C. 10; Kampot, C. 1.

Callosciurus ferrugineus cinnamomeus Temminck.

Sciurus cinnamomeus Temminck, Esq. Zool. Guin., p. 250, 1853—Siem Reap, Cambodia (Thomas, 1929).

REC. 1925–29.—Siem Reap, C. 6.

Callosciurus ferrugineus annellatus Thomas.

Callosciurus ferrugineus annellatus Thomas, Proc. Zool. Soc. Lond., p. 839, 1929—Angkor, Cambodia.

D. & L. 1929–30.—Cambodia 2.

DEL. 1931–32.—Bassac, L. (west bank of Mekong) 2.

Two specimens of this oddly marked squirrel are among those obtained by the botanist H. Poilane, for Delacour and Lowe in 1930. Their exact locality is queried, but some evidence seems to indicate that they came from Kratie, Cambodia. The body color, which Thomas gives merely as "deep rich rufous" is very close to the Claret Brown of Ridgway, and the tail is Maroon, with concealed apical black.

The two fine examples from Bassac have the sides of the head, chin, arms, and the fore and hind feet much darkened, almost

blackish. It is possible that they should be distinguished nomenclaturally, but it is perhaps more probable that they are merely gradients between *annellatus* and one of the numerous named forms of the variable group to which they belong.

Callosciurus finlaysoni subsp.

An imperfect skin without skull from Kratie, Cambodia, is in the Delacour and Lowe collection. Another from "Na Kai," Indo-China, is in the material collected by F. R. Wulsin for the United States National Museum. This is blackish on the back and the base of the tail, but in the absence of comparative material no attempt at exact determination has been made.

Callosciurus sp.

A squirrel from Luang Prabang, Laos, obtained by F. R. Wulsin, may represent an undescribed form allied to *caniceps* and *pygerythrus*, but material is insufficient to ascertain its proper position, especially in view of the great seasonal changes and the high variability known to characterize the group to which it belongs. The single specimen has the under parts and the tail almost the same bright shade as the back, the intervening sides being gray.

Menetes berdmorei mouhoti Gray. BERDMORE'S STRIPED SQUIRREL.

Sciurus mouhotii Gray, Proc. Zool. Soc. Lond., p. 137, 1867—Cambodia.

Menetes berdmorei moerescens Thomas, Jour. Bomb. Nat. Hist. Soc., 23, p. 24, 1914—Bali, near Nhatrang, Annam.

D. & L. 1929–30.—Hon Quan, C.C. 1; Lao Bao, A. 1; Ninh Hoa, Nhatrang, A. 1.

REC. 1925–29.—An Binh, C.C. 1; Angkor, C. 1; Dakto, A. 3; Kontoum, A. 7; Tay Ninh, C.C. 2.

The medium-sized striped squirrels represented by the generic name *Menetes* have a rather limited range from southeastern Burma through Tenasserim and Siam to southern Annam. Within this region Thomas has attempted to distinguish no less than five forms (*berdmorei, consularis, decoratus, moerescens,* and *mouhoti*). To these Gyldenstolpe has added a sixth (*koratensis*) and Kloss, perhaps more justifiably, has given names to forms from islands lying near the coast of Siam (*umbrosus* and *rufescens*).

A somewhat cursory review of the types and other specimens of *Menetes* in the British Museum brings the conviction that perhaps

no more than half the names for mainland forms will ultimately be recognized. Variation due to season is very great, as in *Tamiops* and various other squirrels and, many localities being represented only by single badly prepared specimens, conclusions in which fine distinctions take part seem very uncertain.

The specimen in hand from Ninh Hoa is practically a topotype of *moerescens*, but its skull is smaller than that of the type and seems to indicate that *moerescens* at least should be a synonym of *mouhoti* whether or not this last be separated from *berdmorei*.

It is probable that the last word has not yet been said as to the generic position of these squirrels. Their relation to East Indian species may need investigation and there is also interest in the possibility that they may be allied to *Sciurotamias* through the monotypic *Rupestes* which both externally and cranially presents a combination of the characters of *Menetes* and *Sciurotamias*.

Sciurotamias davidanus Milne-Edwards. PÈRE DAVID'S SQUIRREL.

Sciurus davidanus Milne-Edwards, Rev. Mag. Zool., (2), **19**, p. 196, 1867—mountains near Peking, China.

K.–R.—Ko-chia-ho-pa, Szechwan 1; Trashi-cho-tin, Szechwan 1.

These localities are northeast of Tatsienlu and but a short distance almost directly west of Mouping. The specimens seem quite typical of *davidanus* which has been found mainly farther east and northeast. Just how they are connected to the eastward is not clear but perhaps it is through the province of Hupeh since darker forms occupy the region immediately northward.

Sciurotamias davidanus consobrinus Milne-Edwards.

Sciurus consobrinus Milne-Edwards, Rech. Mamm., pp. 304–305, 1868–74—Mouping, Szechwan.

K.–R.—Tupakeo, Szechwan 1.

A specimen from the region immediately northwest of Mouping may be regarded as practically topotypical of *consobrinus*. It is considerably darker and more richly colored than any of a series of *owstoni* from Shensi. Its feet are blackish and, so far as can be judged by the description, it is practically identical with *S. d. thayeri* G. M. Allen from Washan, Szechwan.

Dremomys pernyi griselda Thomas. LONG-SNOUTED SQUIRREL.

Dremomys pernyi griselda Thomas, Ann. Mag. Nat. Hist., (8), **17**, p. 392, 1916—Nagchuka, Szechwan.

Dremomys pernyi lichiensis Thomas, Ann. Mag. Nat. Hist., (9), **10**, p. 403, 1922—Likiang Range, Yunnan.

K.–R.—Szechwan: Baurong, Yalung River, lat. 29° N. 1; Chi-il, about lat. 29° 20′ N. 1; Mi Lola, between Yungning and Muli, about lat. 28° 10′ N. 5; Tiyu (Gomba), southwest of Baurong 1; 25 miles north of Tatsienlu 1; Wushi, northeast of Baurong 4; Yulongkong, near Tatsienlu 1. Yunnan: Likiang 3; Manyuh Camp, about 50 miles north of Likiang 1; Nguluko, about 20 miles north of Likiang 1; Yungning, near Szechwan boundary 4; watershed south of Yungning 1.

Squirrels of the genus *Dremomys* collected by Herbert Stevens cover a range of dates from February to August, and various localities from Likiang in Yunnan to the region of Tatsienlu in Szechwan. These are supplemented in Field Museum by specimens from the Likiang region received from the Third Asiatic Expedition and by two important topotypes of *lichiensis* from the original series, received through exchange with the British Museum.

Examination of this material finds little justification for the recognition of *lichiensis* as distinct from *griselda*. The variation in color is slight and not correlated with geography. The species lives at very high altitudes where conditions may be assumed to be relatively uniform and it is plain that the larger rivers have not been barriers to its distribution. Probably there is not an elevated area in all of southwestern China in which it could not be found. If typical *pernyi* be recognized from southwestern Yunnan, as defined by Thomas, and *flavior* from southeastern Yunnan, there is scarcely room for *lichiensis*. Even if the slight characters mentioned for it could be substantiated, they would best be explained as simple evidence of gradation between *griselda* and the more southern forms.

Dremomys rufigenis ornatus Thomas.

Dremomys rufigenis ornatus Thomas, Jour. Bomb. Nat. Hist. Soc., **23**, p. 26, 1914—Mongtze, Yunnan, China.

K.–R.—Lieng San, T. 1; Muong Mo, T. 3; Muong Moun, T. 1; Muong Yo, L. 3; Phong Saly, L. 1.

D. & L. 1929–30.—Chapa, T. 19; Pakha, T. 1.

REC. 1925–29.—Backan, T. 3; Bao Ha, T. 1; Ngai Tio, T. 1; Tam Dao, T. 8.

In this series there are two types of coloration, one in which the under parts are mainly whitish and another in which they are wholly pale ochraceous, the only white being on the inside of the arms. Both

types may occur at one locality. Although ochraceous under parts have not been noticed heretofore in the *rufigenis* series, there is little doubt that these specimens should be referred to *ornatus*. In fact, the distinction of *ornatus* from typical *rufigenis* may be strengthened by this tendency to ochraceous under parts which is more than likely to be found in southern Yunnan as well as in Tonkin and Laos. The type of *ornatus* can be matched easily among Tonkin specimens so far as color is concerned. It has the chin, throat, and even the breast pale ochraceous, the belly and the inside of the legs whitish. The upper parts are uniformly colored without any obvious increase in rufescent about the rump and thighs. The usual light hip-patch is present. The ear-patches are whitish at the base with ochraceous tips to the hairs. This is the general style which prevails throughout northern Laos and Tonkin, whereas from more southern localities there is more contrast between the color of the body and that of the hind legs. Some of this is doubtless due to season, but it is probable that a southern race (*fuscus*) can be recognized. Specimens taken in November are more olivaceous and uniform in color than those taken in March and what they might be in July and August is not known.

The skulls of the Tonkin specimens are in general smaller than the skull of the type of *ornatus*, but a competent study of skulls is not possible with present material.

Dremomys rufigenis fuscus Bonhote.

Funambulus rufigenis fuscus Bonhote, Abstr. Proc. Zool. Soc. Lond., p. 2, Jan., 1907—Bali, Annam.

REC. 1925–29.—Col des Nuages, A. 11; Dakto, A. 1; Dalat, A. 1; Djiring, A. 1; Kontoum, A. 1; Napé, L. 3; Thua Lua, A. 1; Xieng Kuang, L. 13.

DEL. 1931–32.—Thateng (1,000 feet above), L. 1.

In his several papers on Indo-Chinese mammals, Thomas has been chary about the reference of individual specimens of *Dremomys* to definite subspecies. It is clearly a difficult group and it is probable that the number of names now extant is more than sufficient. Although Thomas has continued to do so, there seems little reason for withholding the name *fuscus* from the form of southern and central Annam. Specimens from Col des Nuages are, for the most part, essentially the same as the type series of *fuscus*. At best these could be no more than intermediates between *fuscus* and the supposed form called *laomache* (Thomas, Ann. Mag. Nat. Hist., (9), 7, p. 182,

1921) from the vicinity of Pak Hin Bun, Laos. That *laomache* is itself only a slight gradient between *fuscus* and *ornatus* also is extremely probable. Specimens from Kontoum, Annam, are closely similar to the type of *laomache* and others from Xieng Kuang are but slightly different, while from Napé, Laos, but a short distance away, are specimens agreeing with *fuscus* from southern Annam. The single specimen from the Boloven Plateau perhaps should represent *laomache* on geographic grounds, but it shows no distinguishing characters.

Dremomys pyrrhomerus gularis sp. nov.

Type from Mount Fan Si Pan, near Chapa, Tonkin. Altitude 8,000–10,000 feet. No. 32.4.19.5. British Museum. Adult male. Collected Dec. 3, 1929, by J. Delacour and W. Lowe. Orig. No. 1,551.

Diagnosis.—Similar to *D. pyrrhomerus* and *D. rufigenis* but chin and throat and inner sides of hind legs rich Ochraceous Tawny in abrupt contrast to other under parts; flank patch obsolescent and reduced to a narrow line scarcely more evident than in *rufigenis;* cheeks, nose and forehead less tawny than in *rufigenis*, nearly or quite as in *pyrrhomerus.*

Color.—Upper parts (November and December specimens) grizzled brownish to olivaceous (Prouts Brown to Olive Brown), about as in *rufigenis*, more saturate than in *pyrrhomerus;* a short blackish line usually evident on middle of back; top of head, nose and sides of face from slightly below eyes like back; lower cheeks and base of whiskers ochraceous tawny continuous with chin and throat; light patches behind ears whitish basally, Ochraceous Buff to Cinnamon apically; flank-patch scarcely evident except as a slight extension of the color of the inner sides of the hind legs; hands and feet grizzled blackish usually with a tinge of ochraceous; tail slightly paler or practically as in *rufigenis* and *pyrrhomerus*, the under side mainly bright Ochraceous Tawny narrowly bordered by gray-tipped black; upper side of tail coarsely grizzled, the hairs with five annulations including a whitish tip; under parts divided into three sharply contrasted color areas; chin, throat, fore-breast, and a narrow line on inner sides of arms Ochraceous Tawny, the hairs with narrow dark bases; base of tail, anal region, and entire inner sides of thighs also Ochraceous Tawny; midventral region and a short extension on hind side of arms whitish gray, the hairs broadly dark basally and narrowly tipped with creamy white.

Skull.—Size rather large with a broad full braincase; rostrum averaging shorter and heavier than in *pyrrhomerus;* supraorbital border with a well-marked notch.

Measurements.—Average of ten adults measured by the collector: head and body 216; tail 168; hind foot (s.u.) 45. Skull of type: greatest length 57.6; condylo-basal length 50.2; zygomatic width 31; interorbital width 16.7; median length of nasals 17.9; least width of nasals 4; diastema 12.8; upper toothrow 10.1.

Remarks.—This is a very distinct form, perhaps a separate species, but various general resemblances to *pyrrhomerus* and the fact that it occurs at high elevations within the area occupied by *rufigenis* lead to the inference that it is most probably a southern representative of *pyrrhomerus.* To some extent it combines certain of the characters of *rufigenis* and *pyrrhomerus* since it resembles *rufigenis* in lacking the prominent flank-patch but is more like *pyrrhomerus* in the color of the head. It differs strikingly from both in its brightly colored throat and hind legs. The slight tendency to a dark dorsal line shown in some specimens of *pyrrhomerus* is repeated in *gularis.* In cranial characters, also, the resemblance between the two is obviously close. When more material is obtained from the southern provinces of China, therefore, it is not unlikely that gradations will be found.

A large series of thirty-eight specimens of this handsome new squirrel was obtained by Delacour and Lowe during their long stay at Chapa, Tonkin. Some of them were labeled as coming from elevations no higher than 5,000 feet but since they were derived from native hunters there may be doubt as to the exact height at which individual specimens were taken. A considerable number are known definitely to come from Mount Fan Si Pan and at the highest altitudes, from 8,000 feet upward, this was the only species of *Dremomys* obtained. Here it was found in company with *Tamiops olivaceus,* microtines, and other species having affinities with northern forms. Most of the specimens are in slightly worn but rather thick pelage in which the median under parts have the basal color of the hairs somewhat exposed. For this reason the collectors, in their field catalogues, distinguished the species as the "blue-bellied squirrel."

Tamiops swinhoei Milne-Edwards. SWINHOE'S STRIPED SQUIRREL.

Sciurus macclellandii var. *swinhoei* Milne-Edwards, Rech. Mamm., p. 308, 1868–74—Mouping, Szechwan.

K.–R.—Lian-feng-kang, near Omei-Shan, Szechwan 1.

This is fully typical and has been compared with a specimen from Mouping formerly in the Paris Museum but now in the British. Other Szechwan examples seen are from Yeng-ling-pa and Hea-kea-tun, as well as a further fine specimen from Omei-Shan collected by M. P. Anderson during the Duke of Bedford's exploration of eastern Asia.

The specimen in hand was taken Oct. 8, 1929, by Herbert Stevens and is in very handsome pelage, with five black stripes, two outer light stripes of dark cinnamon-buff, measuring about 10 mm. in width, and two inner light stripes of cinnamon-brown.

There seems no doubt that *swinhoei* should stand as a species distinct from the "*macclellandi*" and probably also from the "*maritimus*" series. Its large size sets it off from most of these, but, as elsewhere noted, it probably intergrades with *clarkei* and through this possibly also with *monticola* and *olivaceus*. Its skull is characterized by unusually large audital bullae which are only equaled by those of *T. vestitus* of the Peking region. Therefore a gradation between *vestitus* and *swinhoei* may be looked for in future collections.

Tamiops swinhoei clarkei Thomas.

Tamiops clarkei Thomas, Ann. Mag. Nat. Hist., (9), 5, p. 304, March, 1920—Yangtze Valley, northern Yunnan (lat. 27° 20′ N.; long. 101° E.).

K.–R.—Kulu, upper Yalung River, western Szechwan 1; Wushi, southwest of Tatsienlu, Szechwan 1.

These specimens have considerable interest as probably illustrating the "left-over" winter pelage of *T. s. clarkei* and indicating its subspecific relationship to *swinhoei*. They were taken in April and May and are in long, shaggy, partly worn pelage, quite different from the smooth, short coats of the type and other available specimens of *clarkei*. On the top and sides of the head, however, they are much paler than in *swinhoei* and closely similar to *clarkei*. The outer light stripes are fairly marked but suffused with fulvous and they are shorter and broader than might be expected in *clarkei*. The tails are broader and more ochraceous than in *clarkei*. On the whole they seem to combine characters of *swinhoei* and *clarkei*, but probably are much nearer the latter. Their skulls are slightly smaller and the audital bullae are quite markedly smaller than in *swinhoei*. This difference in the bullae seems almost sufficient to be of specific importance, but available skulls of typical *swinhoei* are few in number and the probability of complete intergradation is very strong.

Tamiops macclellandi rodolphei Milne-Edwards.

Sciurus (Tamias) Rodolphii Milne-Edwards, Rev. Mag. Zool., (2), **19**, p. 227, 1867—Cochin China near Saigon.

A single specimen of this squirrel is among the collections obtained by Delacour and Lowe from the botanist Poilane. Its exact locality is not stated. The type, collected by Rodolphe Germain, was said to be from "Cochinchine" and doubtless came from the region of Saigon. The original description mentions the color of the under parts "un beau jaune orange" which characterizes the form. It is well represented in the British Museum by specimens from several localities in Cochin China, including An Binh, Tay Ninh, Trang Bom (twenty-five miles east of Saigon), and Saigon. There are also five specimens from Djiring, Annam, and one from Bali, near Nhatrang.

Specimens from Angkor and Sambor, Cambodia, referred by Thomas (1929, p. 840) to *rodolphei* seem to agree more nearly with subspecies *liantis* (syn. *lylei*) which is very close to *rodolphei* on the one hand and to *kongensis* on the other. The type of *T. m. dolphoides* Kloss (Jour. Nat. Hist. Soc. Siam, 4, p. 101, 1921) has not been examined, but its locality, in western Cambodia, indicates its close affinity. Assuming continuous distribution, the transition from *rodolphei* to *barbei* evidently takes place via *dolphoides*, *liantis*, and *kongensis*. Whether or not so many names are justified in such a limited area may not be demonstrable at present, but, as further material accumulates, consideration will be needed as to the possibility that one or more of them should be regarded merely as "intermediate."

Tamiops macclellandi inconstans Thomas.

Tamiops inconstans Thomas, Ann. Mag. Nat. Hist., (9), 5, p. 306, March, 1920—Mongtze?, Yunnan.

D. & L. 1929–30.—Pakha, T. 1.

REC. 1925–29.—Ba Be, T. 3; Bao Ha, T. 9; Thai Nien, T. 4.

All the specimens thus far obtained of this rare form are from the valley of the "Fleuve Rouge" in a very limited area in southern Yunnan and northwestern Tonkin. Only the dull, winter pelage is represented, but the presence of four light stripes as well as the size and cranial characters leaves no doubt of the close relationship to *macclellandi*. All the stripes are less contrasted with each other than in other forms and the inner pair of light stripes is decidedly

less distinct than the outer. Interruption of the subocular stripe at the shoulders is less than in *dolphoides* and in many specimens there is practical continuity. In the summer pelage it would not be surprising to find it as unbroken and well marked as in *barbei*. The under parts are deeper-colored than in Annamese *dolphoides* and practically the same as in *barbei*.

The connection of this form with other members of the *macclellandi* series is possible either through *barbei* or *dolphoides* or perhaps through both. In the stretch of coast between Hanoi and Huê there is room for gradation into *dolphoides*, but, although some collecting has been done in this region, nothing of the kind has yet been found. Intergradation with *barbei* also is to be looked for in the region between Tonkin and Upper Burma, for specimens apparently indistinguishable from *barbei* have been recorded from Mengting, Yunnan, in this latitude by G. M. Allen (Am. Mus. Novit., No. 163, p. 7, 1925).

The occurrence of *inconstans* and *hainanus* at the same localities in Tonkin furnishes further evidence of the specific distinctness of the *macclellandi* and *maritimus* series.

Tamiops macclellandi dolphoides Kloss.

Tamiops macclellandi dolphoides Kloss, Jour. Nat. Hist. Soc. Siam, 4, No. 2, p. 101, March, 1921—Kompong Som Bon, near Sre Umbel, Cambodia.

K.-R.—Phouc Mon, Quangtri, A. 3.

D. & L. 1929–30.—Ninh Hoa, north of Nhatrang, A. 1.

DEL. 1931–32.—Pakse, L. 2; Paksong, L. 2; Paleng, L. 2; Phukong Ntoul, L. 3; Thateng, L. 24 (12 alc.).

REC. 1925–29.[1]—Col des Nuages, A. 7; Dakto, A. 10; Kontoum, A. 7; Napé, L. 1.

The small striped squirrels of east-central Annam differ from *rodolphei* in having the upper parts darker, more olivaceous, and the under parts Ochraceous Buff with a yellowish tinge instead of Orange Rufous. Possibly they should be segregated under a new name, but since *dolphoides* is described as having yellowish rather than orange rufous under parts, it seems best for the present to treat them under that name. Probably they will prove to be more differentiated from *rodolphei* than is *dolphoides* from its type locality, and it may be that we have here one of those unfortunate but unavoidable cases in which the type locality is near the periphery

[1] Recorded under the name *rodolphei*.

of the range of a definable form and the type is in a certain sense "not typical."

There is some indication, also, of tendency toward *T. m. inconstans* and, although *Tamiops* of the *macclellandi* series have not been taken in northern Annam and southern Tonkin in the area intervening between the ranges of *dolphoides* and *inconstans*, the possibility that they may occur there cannot as yet be excluded.

Tamiops macclellandi kongensis Bonhote.

Sciurus macclellandi kongensis Bonhote, Proc. Zool. Soc. Lond., p. 55, 1901—Raheng, Siam.

WULSIN 1924.—Vientiane, L. 5.

Five specimens taken in July at Vientiane are more grayish than *barbei* and may be referred provisionally to *kongensis*. A form (*laotum*) allied to *maritimus* also occurs at this locality which is thus shown to be in the area in which there is overlapping of the *macclellandi* and *maritimus* series.

Tamiops maritimus hainanus Allen.

Tamiops macclellandi hainanus J. A. Allen, Bull. Am. Mus. Nat. Hist., 22, p. 476, Dec., 1906—Lei-Mui-Mon, island of Hainan, China.

Tamiops macclellandi riudoni J. A. Allen, l.c., p. 477—Riudon, island of Hainan, China.

K.-R.—Ba Nam Cai, T. 1; Boun Tai, L. 1; Chapa, T. 5; Lai Chau, T. 2; Lao Fou Chai, L. 1; Lieng San, T. 5; Muong Boum, T. 6; Muong Mo, T. 7; Muong Moun, T. 5; Muong Yo, L. 5; Nong Lum, T. 3; Pa Ham, T. 2; Phong Saly, L. 6; Phong Tho, T. 1.

D. & L. 1929–30.—Chapa, T. 10; Hoi Xuan, A. 8; Lung Lunh, A. 1; Pakha, T. 2.

A study of this material, all from one general region and representing numerous localities and dates, leads to much uncertainty as to the validity of various color-characters supposed to differentiate closely allied forms within the group. A selected number of specimens was taken to London and there compared with the series in the British Museum, including the types of *maritimus, monticola, laotum*, and *moi*. This series includes specimens from Xieng Kuang and Napé, Laos, which Thomas has referred to *laotum*, as well as others from Backan and Chora, Tonkin, which the same author regarded as inseparable from *maritimus*. In London the conclusion was formed that all the specimens from Tonkin and Laos should

be referred to one form with the qualification that those from more southern and western localities averaged paler than those from farther north and east. Subsequent study in Field Museum, which has some twenty specimens from the island of Hainan, brought up the question of the supposed distinction of an insular form. This has forced the opinion that present material does not justify any separation in this case. If there be any distinction it must be one of very slight average characters which cannot as yet be demonstrated. Excluding specimens from Napé, Laos, and others from the same region, which are grading toward *laotum*, makes this conclusion the more evident. If it be assumed that the same variations and seasonal changes are found on the island as on the mainland, there is no basis for separation. That two distinct species occur on the island is highly improbable without some differences in size and cranial characters. Such differences do not appear in two topotypes of "*riudoni*," kindly loaned by the American Museum of Natural History, and although these differ in color from most other Hainan specimens, they can be matched easily by mainland specimens among which a greater range of seasonal variation is shown than in collections from Hainan thus far made. The specimens representing *riudoni* were taken by a Chinese collector and are discolored on the throat and chest, evidently by some preservative or other extraneous means. The remaining under parts are rather dark but not more so than in many specimens from various localities in Tonkin. Therefore, it must be concluded that evidence is as yet insufficient to demonstrate the distinction of *riudoni* from *hainanus*.

As noted by G. M. Allen (Am. Mus. Novit., No. 163, p. 7, 1925), *hainanus* is distinguished from *maritimus* by having a smaller, more slender foot. Measurements taken from dried skins of *maritimus* show a foot-length of 32–34, whereas those taken in the same way from *hainanus* are only 28–30. This difference in the size of the feet is borne out by the skulls, those of *maritimus* being decidedly larger than in *hainanus*. Therefore, although color characters are baffling and uncertain, the separation of *maritimus* and *hainanus* on the basis of size is quite simple.

Practically all the specimens now in museums were taken in what may be called the winter season. The dates range only from November to May, leaving the long period of not less than five months from June to October unrepresented. It is evident also that dates alone are not wholly reliable guides as to comparability of pelages. Thus Hainan specimens taken in December and January

are not in the same stage as those taken on the mainland at the same dates but correspond more closely to stages which are not reached on the mainland until a month or two later. In general, the winter pelage (December to March) in its extreme form is very dull, the outer light stripes are narrow and clouded, and the median dark line is not sharply contrasted; the entire under parts are usually washed heavily with fulvous. As this pelage wears, the stripes become more defined and contrasted and the median dark stripe, especially, may become quite black and conspicuous before the general pelage shows any obvious signs of wear. In Tonkin and Laos this relatively dull winter pelage becomes frayed and rough in April and May and is then succeeded by a complete new coat in which the under parts are much paler and the stripes are very distinct. A median and one pair of lateral black or blackish stripes are well defined and the lateral light stripes are broad and relatively clear. How long this pelage may be worn is unknown, but late fall specimens (November) often show a coat not greatly worn which is quite similar to it, and it is possible there may be an intervening pelage. At least these changes of pelage provide room for very wide differences in the color and markings of individual specimens and, without series that are strictly comparable, fine subspecific distinctions cannot be drawn. Under these conditions, multiplication of names only produces confusion.

Tamiops maritimus laotum Robinson and Kloss.

Tamiops macclellandi laotum Robinson and Kloss, Ann. Mag. Nat. Hist., (9), 9, p. 92, 1922—Pak Hin Bun, east bank Mekong River, Laos.

K.–R.—Vientiane, L. 1.
D. & L. 1929–30.—Locality unknown 2.
DEL. 1931–32.—Saravane, L. 1.

This form is well characterized by very pale color which reaches its extreme development in southern Laos. Specimens from central and northern Laos (Napé and Xieng Kuang), which were heretofore regarded as *laotum*, are approaching *hainanus*. Even the type of *laotum* is somewhat darker than more southern specimens, but its departure from *hainanus* in the direction of general paleness is sufficiently marked.

The specimen from Vientiane, taken July 2, is in full "summer" pelage in which three broad black dorsal stripes are sharply marked. The outer light stripes are very broad and distinct.

Tamiops maritimus moi Robinson and Kloss.

Tamiops macclellandi moi Robinson and Kloss, Ann. Mag. Nat. Hist., (9), 9, p. 92, Jan., 1922—Langbian Plateau, southern Annam.

D. & L. 1929–30.—Dalat, Langbian Plateau, A. 1.

A single specimen taken by Jabouille is in the collection. It is in excellent condition and, although dated September 12, it seems to resemble most closely specimens of *hainanus* from Tonkin and Laos taken in March, April and May. It appears to be in the last stages of a renewed pelage in which traces of a previous, worn coat remain only on the sides. The stripes are well marked and the outer light ones are suffused with fulvous, especially in their posterior half, but this is not distinctive since the same character is found in many specimens of *hainanus*. The under parts are uniformly pale creamy, much paler than in the type of *laotum* but quite like other specimens taken at a different season.

On the basis of this specimen alone, it would be difficult to find any character by which to separate *moi* from northern specimens, especially those which stand in a position intermediate between *laotum* and *hainanus*. Until series in comparable pelages can be examined, the status of the form may remain in doubt. In the British Museum are six specimens from Djiring, Annam, representing *moi*, but they are in such condition that their color seems untrustworthy. All have deep, ruddy tones suspiciously like those so often acquired when fresh specimens are temporarily immersed in liquid preservative before skinning. The type of *moi* and one apparently normal specimen from Djiring have a certain suggestion of this ruddiness, but altogether the material is much too scanty for reliable conclusions.

Tamiops monticolus olivaceus subsp. nov.

Type from Lo Qui Ho, Mount Fan Si Pan, near Chapa, Tonkin. Altitude 8,000–10,000 feet. No. 32.4.19.6. British Museum. Adult male. Collected Nov. 20, 1929, by J. Delacour and W. Lowe. Orig. No. 1,248.

Diagnosis.—Similar in size and general characters to *T. monticola* and *T. m. forresti*, but general color dark olivaceous rather than brownish, grayish or buffy; under parts Olive Ocher instead of Cinnamon-Buff; stripes varying according to pelage from a condition showing only one unclouded median stripe to that in which there is a median and four lateral black stripes.

Color.—General color dark but strongly olivaceous; markings as usual, with the subocular stripe discontinued at the shoulder; in dull (winter) pelage there is a short and narrow median black stripe bordered on either side by broader light stripes concolor with the general body color which is nearly Buffy Olive or Light Brownish Olive finely stippled with blackish; following these is the pair of principal dark stripes which are mainly brownish (Dresden Brown) with faint indications of underlying black; the principal lateral stripes are well-defined buffy slightly clouded and varying from Cream Buff to Olive Ocher; under parts Deep Colonial Buff to Olive Ocher. In a later pelage, probably produced by simple wearing away of the tips of the hairs, the entire coat is darker throughout and all the dark stripes have become pure black, including short ones below the outer lateral light stripes and making five black stripes in all; the submedian light stripes are clearer and more whitish than in the other pelage; the tail is mixed Tawny Olive and black, much darker than in *forresti* and slightly darker than in *monticolus*.

Skull.—General shape elongate with the rostrum produced and the anterior zygoma root sloping rather than "squared"; slightly smaller than in *monticolus*, about as in *forresti;* audital bullae rather small.

Measurements.—Type, measured by collector: head and body 119; tail 105; hind foot (s.u.) 27. Skull of type: greatest length 37.1; condylo-basal length 31.9; zygomatic width 20.7; least interorbital width 12.2; width of braincase 17.8; length of nasals 10.5; palate from henselion 14.9; greatest diameter of audital bulla 6.7; upper toothrow 6.5.

Remarks.—Seventeen specimens of this well-marked form were obtained by Delacour and Lowe in the Fan Si Pan highlands near Chapa. Here it was associated with *Dremomys p. gularis, Eothenomys,* and other mammals of wholly northern affinities. Its distinction from *T. hainanus,* which occurs on the same mountains at lower levels, is obvious. A third species (*inconstans*) is found also in the same region, apparently on still lower ground or perhaps merely in a different ecological niche.

Although all the specimens were taken within a very brief period (Nov. 19–Dec. 7), they present two phases of pelage, one in which the lateral dark stripes are clear and contrasting, and another in which they are heavily overcast with brownish or olivaceous. Which

of these conditions precedes the other is difficult to determine, but examination of other material seems to indicate that the dull pelage is that of full midwinter and is not only followed but also preceded by a condition in which the stripes are more clearly defined. The possession of both these phases in the present series makes comparison with *monticolus* and *forresti* simple and certain.

The discovery of this form in the highlands of Tonkin in close proximity to two others (*hainanus* and *inconstans*) very distinct from it and from each other furnishes clear evidence that at least in this region the genus *Tamiops* includes three distinct species. That these might be local representatives of three widespread species, each with various geographic races, was a natural assumption and, in attempting to test it, all the described forms of the genus have been examined. A thorough revision of the group was not possible and it is plain that material is not yet sufficient for wholly satisfactory conclusions, but all specimens have been reviewed in the British Museum and Field Museum, together with certain others from the United States National Museum and the American Museum of Natural History.

Since various names are yet represented only by single specimens and since even others of which specimens are fairly numerous do not present more than one phase of pelage, it is too early for a clean-cut and positive analysis of the group. It is evident, however, that previous ideas of relationships need considerable revision and a general discussion of both certainties and probabilities can do no harm. Apparently cranial characters have had little attention in this group and careful consideration of them is often of much assistance in cases where the baffling pelages do not furnish satisfactory clues to affinities or distinctions. The state of knowledge of *Tamiops* is somewhat comparable to that of the American genus *Eutamias* some thirty years ago before pelage changes had been completely worked out. In not a single case, among all the numerous described forms, does material exist showing the progress of the pelages throughout the year.

For purposes of discussion the genus may be divided into two principal groups as follows:

Tamiops swinhoei group.—This group is northern in distribution and is characterized mainly by large size and, with few exceptions, by the interruption of the subocular stripe at the shoulders. Present indications are that it includes at least two and perhaps three distinct species (*swinhoei*, *monticolus* and *maritimus*), but the possibility of

the inosculation of all three cannot positively be eliminated. Names in this group which seem entitled to some sort of recognition are:

Tamiops swinhoei Milne-Edwards, Mouping, Szechwan.
clarkei Thomas, upper Yangtze, Yunnan.
vestitus Miller, Chihli Province, China.
monticolus Bonhote, Chin Feng Ling, Fukien.
olivaceus Osgood, mountains near Chapa, Tonkin.
spencei Thomas, Kachin Province, Burma.
forresti Thomas, Likiang Mountains, Yunnan.
russeolus Jacobi, Atentze, Thibet.
maritimus Bonhote, Foochow, Fukien.
formosanus Bonhote, Formosa.
hainanus J. A. Allen, Hainan, China.
laotum Robinson and Kloss, Pak Hin Bun, Laos.
moi Robinson and Kloss, Langbian, Annam.

Beginning with typical *swinhoei*, it is found that color gradations exist connecting it with *clarkei* and that cranial characters (large audital bullae) show it to be very closely allied to *vestitus*. These three then offer strong probability that they are geographic races of one species. Next is a series including *monticolus*, *olivaceus*, *spencei*, *forresti*, and *russeolus* which are approximately the same in size and cranial characters and differ from each other mainly in shades of color. There can be little doubt, therefore, that they are intergrading subspecies. Adequate material representing *spencei* and *russeolus* has not been seen, but their inclusion in the series seems well justified. Three specimens from Mucheng, Yunnan, referred by G. M. Allen (Am. Mus. Novit., No. 163, p. 5, 1925) to *swinhoei* seem like *spencei* as described and, although differing slightly from *monticolus*, they are more like that form than *forresti* and *olivaceus* which are geographically nearer. The relationship of the members of this series to *clarkei* is uncertain. None of them quite equals it in size, but some are closely similar in color, and all have skulls much as in *clarkei* except that they are smaller. The types of *clarkei* and *forresti* come from localities in Yunnan not widely separated and it has been assumed that they are wholly distinct species. Actual differences between them, however, are not too great to be bridged and, until clear proof to the contrary is produced, the suspicion may be entertained that not only *clarkei* but *forresti*, *monticolus* and others of the same series all may be subspecies of *swinhoei*.

The remaining members of the *swinhoei* group, *maritimus* and *hainanus*, offer further uncertainties. It was Bonhote's belief that *maritimus* and *monticolus* occupied different adjoining areas in Fukien, one on the coast and the other in the interior mountains,

but he treated both as subspecies of *macclellandi* and recorded specimens of both from one inland locality, Kuatun. The color characters by which he distinguished them, however, are largely or wholly accountable as phases of pelage. Those in the dull phase with indistinct stripes he called *maritimus* and those with bright distinct stripes *monticolus*. Specimens so far examined from the coast of Fukien are all in the dull pelage and, while other pelages are not represented from that region, there is no convincing evidence of color distinctions between *maritimus* and *monticolus*. Likewise there appears to be no difference in size, both being relatively large as compared to *hainanus* and quite equal to any of the larger forms of the genus except *swinhoei* and *clarkei*. The skulls, however, do offer a slight basis for separation. Only a few comparable skulls are at hand, but, so far as they go, those of *monticolus* have the anterior zygoma root somewhat compressed and sloping whereas those of *maritimus* have it abruptly bowed out or "squared." The sloping type is found also in *olivaceus*, *forresti*, and others of that series and the squared type is most pronounced in *vestitus* of the Peking region. As a working hypothesis, therefore, it is possible to entertain the idea that *monticolus* and *maritimus* are distinct and that one has its connections to the westward and the other in the north. This is strengthened by the occurrence of *olivaceus* and *hainanus* in Tonkin side by side and obviously distinct. That *olivaceus* in this region represents *monticolus* and *hainanus* represents *maritimus* may not be wholly certain but the inference is very strong. If there are two distinct species in Tonkin doubtless there are two in Fukien, although on account of imperfect material characterization of the latter is difficult. Complete gradation between *maritimus* and *hainanus* awaits proof with further specimens, but the difference between them is mainly one of size so no great assumption is required. Connection between *maritimus* and *vestitus* is suggested by resemblance in the shape of the skulls, but the differences in color and in the size of the audital bullae are pronounced and assumption of intergradation is probably not warranted at this time. Material representing *formosanus* is scanty but its close relationship to *maritimus* is scarcely to be questioned. *T. sauteri*, also from Formosa, is of doubtful status, its description indicating mainly characters which are likely to be seasonal.

It is plain that knowledge of this group is as yet quite imperfect. There is much need for competent field studies and for series from single localities taken at different seasons. The relationships of

maritimus and *monticolus* should be carefully worked out in Fukien and much new material should be obtained from the provinces of central and southern China. There could be no better indication that these provinces hold the solution of much that is puzzling in the distribution and relationships of Asiatic mammals. *Tamiops* is doubtless common over much of China, yet we have specimens only from the four corners of the country with little or nothing along connecting lines or from the great central area.

At present there is perhaps no better course than to consider the *swinhoei* group as consisting of three species, *swinhoei*, *monticolus*, and *maritimus*. In doing so, some reservations may be made, but at least the treatment will be consistent with what knowledge we now have.

Tamiops macclellandi group.—This group is mainly southern and lowland in distribution, ranging from northeastern India through Assam and northern Burma, southward into Tenasserim and the Malay Peninsula, and thence across Siam and Cochin China to Annam and Tonkin. In the western part of its range it represents the genus *Tamiops* alone, but in the east in Annam and Tonkin it is found in juxtaposition with members of the *swinhoei* group. It does not enter China and apparently does not ascend to great heights elsewhere. It is characterized by relatively small size (toothrow 5.5–6 mm.) and, with one exception (*dolphoides*), by continuity of the subocular stripe and the outer light dorsal stripe. Complete gradation between all the named forms is scarcely to be doubted and in most cases is quite demonstrable. The names in this group most likely to have permanent recognition are the following:

Tamiops macclellandi Horsfield, Assam.
m. pembertoni Blyth, Bhutan.
m. barbei Blyth, Tenasserim.
m. novemlineatus Miller, lower Siam.
m. liantis Kloss, Cape Liant, Siam.
m. kongensis Bonhote, Raheng, Siam.
m. rodolphei Milne-Edwards, Cochin China.
m. dolphoides Kloss, Cambodia.
m. inconstans Thomas, Bao Ha, Tonkin.

Two rather well-known names, *manipurensis* and *lylei*, are not included in this list. In the case of *lylei*, the omission is obviously necessary, since its type locality is but a few miles from that of *liantis* which antedates it. As for *manipurensis*, it may be granted that further material could conceivably substantiate it as a valid race, but it stands directly between *macclellandi* and *barbei* and seasonal variations in both seem sufficient to cover its supposed

characters. As stated elsewhere, the inclusion of *inconstans* as a subspecies in this series may need confirmation since complete intergradation is not yet fully demonstrated.

Typhlomys cinereus chapensis subsp. nov. BLIND TREE MOUSE.

Type from Chapa, Tonkin. No. 32.4.19.7. British Museum. Adult female. Collected Nov. 24, 1929, by J. Delacour and W. Lowe. Orig. No. 1,321.

Diagnosis.—Similar in color and general characters to *T. cinereus* of Fukien, but decidedly larger.

Color.—Upper parts Deep Mouse Gray to Blackish Mouse Gray; under parts dull buffy, the hairs with dark bases; hands whitish; feet mainly dusky, the sides and the toes whitish; tail dusky, with or without a white pencil.

Skull.—Generally similar to that of *cinereus*, but nearly 20 per cent larger.

Measurements.—Average of ten adults measured by the collector: head and body 88.5 (80–98); tail 125 (117–135); hind foot without claws 22. Skull of type and an adult of *cinereus* (in parentheses): greatest length 25.6 (22.7); zygomatic breadth 14.2 (11.8); interorbital constriction 5.5 (4.8); nasals 7.6 (6.4); interparietal 10 x 4 (7.8 x 3.1); palate from gnathion 12.8 (10.8); postpalatilar length 9.3 (7.9); diastema 7.2 (5.8); upper toothrow 4 (3.6).

Remarks.—Practically all hitherto known specimens of *Typhlomys* have proceeded from Fukien, China, the type region of *cinereus*. Its occurrence in Tonkin is therefore an important extension of range and its high degree of specialization marks it as one of the outstanding examples of mammals which are peculiar to Tonkin and southern China. The specimens from Tonkin show an abrupt and marked difference in size from those of Fukien although general characters are the same.

Apparently the habits of this animal, which should be exceedingly interesting, are still quite unknown. Fourteen specimens were obtained by Delacour and Lowe at Chapa, all received from native collectors.

Rattus norvegicus socer Miller. NORWAY RAT.

Epimys norvegicus socer Miller, Proc. Biol. Soc. Wash., 27, p. 90, May, 1914—Taochow, Kansu, China.

K.–R.—Nguluko, Yunnan 85.

A very large series of Norway rats was obtained by Stevens at Nguluko, just north of Likiang. In view of their great abundance there, it is worthy of remark that they were not taken at any other locality on his entire route from Burma to northern Szechwan.

Rattus rattus sladeni Anderson. SLADEN'S BROWN RAT.

Mus sladeni Anderson, Anat. Zool. Res. W. Yunnan, p. 305, 1878—Kakhyen Hills, Yunnan.

Rattus rattus sladeni Allen, Am. Mus. Novit., No. 217, p. 2, June 16, 1926.

K.–R.—Ba Nam Nhung, T. 7; Chapa, T. 1; Muong Boum, T. 3; Muong Mo, T. 2; Muong Yo, L. 1; Phong Tho, T. 2.

D. & L. 1929–30.—Chapa, T. 1; Pakha, T. 6.

DEL. 1931–32.—Thateng, L. 14.

Rats from the highlands of northwestern Tonkin answer fairly well to the description of *sladeni* as identified by Kloss and G. M. Allen. The distinction of *R. r. sikkimensis* from this form seems doubtful, but *R. r. hainanicus*, as judged by a single adult topotype, has larger audital bullae as well as a longer tail. Large bullae, however, are given as characteristic of *R. r. thai* (Kloss, Jour. Nat. Hist. Soc. Siam, **2**, p. 286, 1917) from Raheng, Siam, of which no specimens have been examined in this connection.

Specimens referred to *sladeni* by G. M. Allen from Namting River at the Burma border and kindly loaned by the American Museum of Natural History include one very bright-colored example, but are essentially like the material from Tonkin. The largest of the Burmese specimens does not equal the largest from Tonkin. Respective measurements of these two are: total length 378, 433; tail 208, 232; hind foot 35, 38. In length of tail, therefore, the Tonkin rats equal *hainanicus*.

A specimen from Chapa is doubtfully placed here, its skull possibly being mismated. There is variation in the number of mammae, some specimens having twelve and others ten.

The specimens from southern Laos, of which only a few are adults, show no distinction from those of Tonkin. The females among them have twelve mammae.

Rattus nitidus Hodgson.

Mus nitidus Hodgson, Ann. Mag. Nat. Hist., (1), **15**, p. 267, 1845—Nepal.

Mus griseipectus Milne-Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, **7**, p. 93, 1871—Szechwan, China.

Rattus nitidus Hinton, Jour. Bomb. Nat. Hist. Soc., 26, p. 412, May, 1919.
Rattus griseipectus Allen, Am. Mus. Novit., No. 217, p. 7, June 16, 1926.

K.–R.—Szechwan: Kulu 13; Muli 1; Yatsu 1. Yunnan: Lutzulu 3; Nguluko 1; Yungning 16.

Receipt of a large series of *Rattus nitidus* from Sikkim reveals essential agreement with material from southern and western China for which the name *griseipectus* has recently been in use. Even subspecific recognition of *griseipectus* seems doubtful. In some of the Chinese specimens there is a tendency to the development of an irregular white line on the breast or midventral region. Elsewhere the hairs of the under parts are with dark bases and dull buffy or silvery whitish tips. In the series from Sikkim similar variations are found. *Rattus nitidus obsoletus* from the Chin Hills, Burma, has not been examined. Two specimens without skulls in the Delacour collection from Chapa, Tonkin, seem closely allied to or identical with *nitidus*. Under the name *griseipectus* the species has been recorded by Allen from Fukien and Hainan, but it appears to be rare in Tonkin.

Rattus concolor Blyth. LITTLE BURMESE RAT.

Mus concolor Blyth, Jour. As. Soc. Beng., 28, p. 295, 1859—Schwegyin, Burma.

DEL. 1931–32.—Pakse, L. 1.
K.–R.—Phouc Mon, Quangtri, A. 10.
WULSIN 1924.—Luang Prabang, L. 1.

This small, dark-colored rat is evidently confined to river highways and the coast region. Since it is habitually a dweller in houses, it may have been introduced into Indo-China. Originally described from Burma, it has been recorded also from Siam and the Malay Peninsula. The present Annam record seems to be the easternmost for the species. In some specimens there is a dark line on the feet as in *R. flavipectus*, but the smaller size, shorter pelage, and the possession of only four pairs of mammae are unmistakable.

A specimen from Luang Prabang belonging to the United States National Museum is tentatively referred to *concolor* although it is much more rufescent than the others and has various minor peculiarities. One from Pakse, farther south, on the left bank of the Mekong River, is normal.

R. sakaratensis of Siam (Gyldenstolpe, Kungl. Svenska Vet. Handl., 57, No. 2, p. 46, pl. VI, figs. 6, 9, 1916), as noted by Kloss

(Jour. Nat. Hist. Soc. Siam, 3, p. 381, 1919), seems not to be allied to *concolor*.

Rattus flavipectus Milne-Edwards. BUFF-BREASTED RAT.

Mus flavipectus Milne-Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, 7, p. 93, 1871—Mouping, Szechwan.

K.–R.—Bactan Trai, T. 1; Ba Nam Cai, T. 9; Ba Nam Nhung, T. 13; Chapa, T. 3; Lai Chau, T. 3; Lieng San, T. 1; Muong Boum, T. 2; Muong Mo, T. 23; Muong Moun, T. 12; Muong Yo, L. 3; Nguluko, Yunnan 2; Nong Lum, T. 1; Pa Ham, T. 9; Phong Saly, L. 18; Phong Tho, T. 5.

D. & L. 1929–30.—Chapa, T. 2; Pakha, T. 2.

WULSIN 1924.—Lai Chau, T. 16.

As indicated by the large number of specimens collected, this rat is very common in the highlands of northwestern Tonkin. On the other hand, only two specimens appear in the collections made by Stevens in Yunnan and, although the type came from Szechwan, recent collectors have taken the species there only in small numbers. So far as examined, the northern specimens have the dingy appearance usual in house rats while the southern ones mostly are clean, bright and trim-looking as in a native species.

At present, it is difficult to make any separation of a southeastern form. The material from Tonkin shows considerable variation in color of the under parts, but the proportion of specimens in which the entire lower surface is heavily ochraceous is very large and the breast stripe is practically always well marked. Specimens from Fukien seem to be similar, although no very satisfactory material is available, and the same is true of more northern specimens.

Apparently there is no tendency in Tonkin toward *R. f. yunnanensis* with its lighter under parts and heavier molars. This latter form, however, is closely allied to a representative of *flavipectus* found in northern India and described by Hinton as *Rattus rattus tistae* (Jour. Bomb. Nat. Hist. Soc., 26, p. 68, 1918). A large series from Sikkim and Bengal Presidency recently received at Field Museum amply shows this to be the case. It is evident, therefore, that *tistae* (and probably also *bhotia*) should be associated with *flavipectus* rather than with *rattus*. As compared with *flavipectus* from Tonkin, *tistae* is somewhat larger with a longer foot and heavier molars and much lighter under parts. Specimens from Upper Burma referred to *yunnanensis* by G. M. Allen appear to be intermediate

between *tistae* and Tonkinese *flavipectus*, although probably nearer *tistae* with which they agree in their heavier molars. Specimens from the actual type locality of *yunnanensis* are not available and will be required before names can be allocated with certainty. Meanwhile there is strong probability that *tistae* should be united with *yunnanensis*.

Rattus flavipectus molliculus Robinson and Kloss.

Rattus molliculus Robinson and Kloss, Ann. Mag. Nat. Hist., (9), **9**, p. 97, 1922—Daban, Phanrang, Annam.

K.–R.—Phouc Mon, Quangtri, A. 30.

A lengthy and variable series of rats from east-central Annam appears closely allied to the form described as *Rattus molliculus* from southern Annam. This conclusion is based mainly upon the original description without actual comparison of specimens. It appears also that there is connection with *R. flavipectus*, since the series in hand shows numerous evidences of intergradation with that species.

In color this series is considerably paler than *flavipectus* and the upper parts in some specimens are not far from those of *R. h. exiguus*. The under parts range from those that are entirely white to those with pure white only on the lower belly, the hairs elsewhere having dark bases and white or pale buffy tips. In most cases the body color is continued to the upper side of the front feet, but is paler and less contrasted than in *flavipectus*. The hind feet are entirely white in twenty-four specimens, but in six others a dark marking is evident. The fulvous breast-marking varies from a scarcely discernible spot to a wide stripe extending to the forepart of the belly. Adults are slightly larger than in *flavipectus*. A very large one and one of average size offer the following collector's measurements: total length 401, 346; tail 227, 177; hind foot 35, 33. The number of mammae is usually ten, but in one specimen, at least, there are twelve.

R. molliculus as described does not show fulvous breast-markings and is evidently like some of the lighter-colored examples in the present series. It is recorded from Ba Na Kham, east of Outeradit, northern Siam, and from Ban Tuoi, Mekong River, near Pissai, Laos, as well as from the type locality in Annam.

Rattus humiliatus exiguus Howell.

Rattus rattus exiguus Howell, Proc. Biol. Soc. Wash., **40**, p. 43, March, 1927—southwest of Yenping, Fukien.

K.–R.—Phouc Mon, Quangtri, A. 1.

A single immature specimen may be referred to this form which appears to differ from typical *humiliatus* mainly in its wholly blackish tail. A "cotype" of *humiliatus* collected by Père David and now labeled "Suenhoafu, Pekin" is in the British Museum. The end of its tail is missing, but otherwise it is in good condition although doubtless originally preserved "in spirit." The color is decidedly rufescent, perhaps partly due to preservative, but another specimen collected more recently (1903) near Nanking is only slightly paler. The feet are white in both specimens and the tail is definitely bicolored. This last character distinguishes it from specimens from Fukien, Hainan, and Annam, all of which have entirely blackish tails.

It seems evident, therefore, that two eastern forms of *humiliatus* may be recognized, one with a bicolored tail ranging from Nanking northward and the other with a blackish unicolored tail extending south to northern Annam. For the southern form, the name *exiguus* is available. Examination of the type and several topotypes of *exiguus*, loaned by the United States National Museum, shows them to be allied to *humiliatus* rather than to *rattus*. Aside from their unicolored tails, they differ from *humiliatus* in paler, less rufescent color. Externally they agree with series from Hainan and the cranial differences which may be noted are supported by such a small number of specimens and localities that separation of another form from Hainan does not yet seem advisable. The type of *exiguus* and one adult topotype have skulls in which the interorbital region is more abruptly constricted, the rostral part of the skull more slender, and the braincase wider than is usually the case in skulls from Hainan. The single specimen from Annam shows a narrow midventral line of buffy like the body color. Such a line does not appear in the small series from Fukien, but in a considerable number from Hainan there is at least one in which a similar line appears.

Rattus humiliatus celsus Allen.

Rattus humiliatus celsus Allen, Am. Mus. Novit., No. 217, p. 5, June, 1926—Taku Ferry, west bank of Yangtze River, Yunnan.

K.-R.—Baurong, Szechwan 1; Mulu, Szechwan 4.

These are somewhat brighter, more rufescent in color than topotypes loaned for comparison by the American Museum of Natural History. The northernmost specimen, from Baurong, has especially heavy cheek-teeth and the whole series, as compared with specimens

from Hainan, indicates that heaviness of the molars is probably a marked character of the race.

Rattus fulvescens Gray.

Mus fulvescens Gray, Cat. Mamm. Nepal & Thibet, ed. 1, p. 18, 1846—Nepal. Cotypes in British Museum.

Leggada jerdoni Blyth, Jour. As. Soc. Beng., 32, p. 350, 1863—Sikkim.

Epimys fulvescens Wroughton, Jour. Bomb. Nat. Hist. Soc., 24, p. 427, 1916—*fulvescens* replaces *jerdoni*.

Rattus fulvescens Wroughton, supra cit., p. 772, 1916.

Rattus huang vulpicolor G. M. Allen, Am. Mus. Novit., No. 217, p. 14, June 16, 1926—Namting River at Burma border.

K.–R.—Chapa, T. 6; Lieng San, T. 4; Lung Lunh, A. 1; Muong Boum, T. 1; Phong Saly, L. 13.

D. & L. 1929–30.—Chapa, T. 47.

This species, long known by the name *jerdoni*, is represented in the British Museum by a few modern specimens from Nepal or nearby localities and by a large number from Sikkim and Assam somewhat farther east. The series includes both the spiny and the soft pelages together with variations and different stages between the two, altogether presenting a great range of color. A further series from Sikkim is now in Field Museum together with some thirty-six specimens from Fukien as well as a few from Hainan. Careful study of all this material in connection with the large accessions from Indo-China indicates that as a species *fulvescens* ranges at least from northeastern India across northern Burma and Tonkin and extends into China in Szechwan, Yunnan and Fukien. Within this area, it is difficult or practically impossible to differentiate more than two subspecies, typical *fulvescens*, which is the more southern form, and *Rattus fulvescens huang*, which appears to be confined to China.

Two topotypes of *R. h. vulpicolor*, loaned by the American Museum of Natural History, are quite indistinguishable from specimens of *fulvescens* in the same pelage from Sikkim. They also agree in detail with various examples from Tonkin. The naming of *vulpicolor* by Allen was, in effect, only the recognition of *fulvescens* which was, at the time, unknown to him.

Although a lengthy series is available from Fukien, the winter pelage is not well represented and there is only slight indication that this pelage may be brighter than in *fulvescens*. Aside from the possibility that it may average slightly smaller and shorter-tailed,

huang seems characterized mainly by a reduction or absence of dusky markings on the feet. These markings are not invariably present in *fulvescens* but are very pronounced in a large percentage of specimens. The position of specimens from Hainan is doubtful. G. M. Allen referred them to *huang*, but with a considerably smaller series than that examined by him, I find them easier to place with *fulvescens* from Tonkin. Although taken in December, they are in bright-colored, spiny pelage. They average slightly larger than *huang* and in several instances have dark markings on the feet.

The disposition of *Mus ling* (Bonhote, Proc. Zool. Soc. Lond., Abstr. No. 23, p. 19, 1905) from Chin Feng Ling, Fukien, is perhaps uncertain, but probabilities favor its elimination as a pure synonym of *huang*. Smaller size is all that could be claimed for it and in most specimens examined this seems due to immaturity. The type of *ling* in the British Museum is at most adolescent although its teeth show slight signs of wear. A specimen from Quangtri, Annam, is closely similar to this type, but is obviously not fully mature. In a large series from Fukien in the British Museum, doubtless determined by Bonhote, the great majority are called *ling* and are preponderantly immatures, while only a few very old and rich-colored examples are labeled *huang*. In all large series the immatures are noticeably smaller than adults and among senescents individuals of exceptional size are not uncommon. Mere size in small series or individuals, therefore, may be misleading. Eastern series of *fulvescens* average very slightly larger than western but it does not seem sufficient ground for separation.

The relationship of *fulvescens* to southern forms is obvious in several instances, especially in that of *R. f. bukit* which can at most be no more than a subspecies and has been so regarded by Gyldenstolpe (Jour. Nat. Hist. Soc. Siam, 3, p. 165, 1919). It is somewhat duller in color than *fulvescens* but otherwise agrees closely. A specimen from Lung Lunh, Annam, in the present collection may be approaching it. Other southern forms may be allied, but close comparisons have not been made. *R. f. mentosus*, which was also examined in this connection, is perhaps a local form of *fulvescens*, but the material representing it is very unsatisfactory, and, until topotypes are obtained, including different ages and pelages, its status is likely to be a matter of opinion. The type series includes only very old, oversized examples with much worn, but rather heavy teeth, and the skins are in an unusual, worn, grayish pelage. The skulls are long and narrow with very long, cuneate nasals which,

with the heavy molars, suggest relationship to *confucianus*. The audital bullae, however, are relatively small as in *fulvescens*. This character usually distinguishes *fulvescens* from *confucianus*, but whether *mentosus* is a local form of *fulvescens* or of *confucianus* is not certain.

Rattus fulvescens champa Robinson and Kloss.

Rattus bukit champa Robinson & Kloss, Ann. Mag. Nat. Hist., (9), 9, p. 96, 1922—Langbian Peaks, Annam.

DEL. 1931–32.—Thateng, L. 7.

These are darker and more spiny than specimens of *fulvescens* from Tonkin. In view of this and their geographical position, their reference to subspecies *champa* seems justified.

Rattus confucianus Milne-Edwards.

Mus confucianus Milne-Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, 7, p. 93, 1871—Szechwan.

K.–R.—Szechwan: Muli 8; Tupakeo 1; 20 miles south of Tze La Lee 5; Wushi 13; Yulongkong 18. Yunnan: near Lutzulu 2; district north of Likiang in bend of Yangtze River 3; Nguluko 6.
D. & L. 1929–30.—Vicinity of Chapa, T. 73.

Stevens did not take this species until he reached the Likiang highlands. His collection includes both winter and summer specimens, showing the usual color variations and no example which is of unusual size.

The very large series from the vicinity of Chapa, Tonkin, covers a wide range of variation in size and color. Reference of this series to *confucianus* is not wholly satisfactory, but, until relationships in the group are better understood, it seems advisable. A considerable number of the specimens are labeled "Lo Qui Ho," which is in the highland above Chapa at an elevation of 9,000 feet or more. Others, obviously the same, are simply labeled "Chapa"; but, since all were brought in by natives, there is no certainty as to the exact elevation at which any particular one was taken. Apparently *R. confucianus* is found exclusively at the higher elevations and is replaced at lower levels by *R. fulvescens*, with the possibility that both may occur together at certain points.

Distinction of *R. confucianus* and *R. fulvescens* in overlapping areas, while generally obvious, is often very difficult as to individual specimens. In *confucianus* and its forms, the size is larger, the color

darker, the tail is frequently white-tipped and the breast marked with fulvous; the audital bullae are larger and more globose, the nasals longer and more compressed behind, and the molars are heavier. Apparent contradictions in these characters or in the combination of them crop out in disquieting manner in a number of instances, but they hold in such a large proportion that their significance is scarcely to be doubted.

The specimens from the highlands of Tonkin apparently average somewhat larger and with coarser and more richly colored pelage than typical *confucianus*, but in view of the names *andersoni* and *excelsior*, applied to northern examples of large size, it is evident that size variations may be considerable. The Tonkin material differs from *R. c. lotipes* of Hainan in possessing pronounced dark markings on the feet.

Measurements of ten of the larger specimens from Tonkin are as follows: head and body 162.6 (152–173); tail 235 (220–255); hind foot with claws (measured dry) 33.3 (32–35). It appears, therefore, that some of them nearly or quite reach the size of *R. andersoni*. A large skull measures: greatest length 43.5; zygomatic width 18; interorbital constriction 6.4; nasals 16.8; diastema 12; palatine slits 7.5; cheek-teeth 6.6. If the number of specimens were limited to a few representing extremes, a nomenclatural division might easily be induced, but with very large series at hand, the only satisfactory conclusion is that the variations and relationships in this group will not be thoroughly understood until a competent student combines field observation with subsequent study of much more and better material than is now in hand.

Rattus indosinicus sp. nov.

Type from Chapa, Tonkin. No. 31,993 Field Museum of Natural History. Young male. Collected Feb. 15, 1929, by Harold J. Coolidge, Jr. Orig. No. 6.

Diagnosis.—A rat of moderate size, with soft or spiny pelage according to age and season, and tail about 40 per cent longer than head and body. Superficially similar to *R. confucianus* and *R. fulvescens*, but tail wholly blackish and hallucal claw somewhat reduced in adaptation to scansorial habits. Mammae 2–2=8.

Color.—Upper parts mixed dusky and Ochraceous Tawny, the sides only slightly paler than the back. Under parts entirely pure white to roots of hairs, in older specimens becoming creamy or

tinged with yellowish. Fore feet white or with an extension of body color to the base of the toes; hind feet similar, the dark area variable and not well defined in the younger examples; tail entirely blackish both above and below.

Skull.—Generally similar to that of *R. confucianus* but with a more expanded braincase, wider interorbital space, shorter nasals, and more highly developed supraorbital ridges. Similar also to that of *Chiromyscus chiropus* except in smaller size, in less prominent postorbital processes, and in more projecting infraorbital plate. Cheek-teeth relatively wide, heavy and brachyodont; first upper tooth with its anterior lamina only slightly indented on its antero-internal surface.

Measurements.—Collector's measurements of three specimens, adult, subadult, and adolescent: total length 331, 324, 285; tail 192, 192, 160; hind foot 29, 31, 29. Skulls of same specimens: greatest length 38.1, 36, 34; condylo-basal length 35, 33.5, 31; zygomatic width 16.4, 17.6, 16.4; interorbital constriction 6.1, 6, 6.1; width of braincase 14.9, 15.6, 14.8; nasals 12.2, 12.3, 12.3; interparietal 10.4 x 6.6, 11.2 x 5.4, 10.5 x 5.4; diastema 10.1, 9, 8.2; width of infraorbital plate 4, 3.7, 3.6; cheek-teeth (crowns) 6.2, 5.8, 6.3; (alveoli) 7, 6.4, 7; width of front upper molar 1.9, 1.9, 2.

Remarks.—Attention was at first drawn to this species by the wholly blackish tails of the three specimens representing it. These three specimens, all from Chapa, include one in spiny pelage, taken by Delacour and Lowe, and two obtained by the Kelley–Roosevelts Expedition, one of the latter in very long, soft pelage without spines, and the other with but a few well-concealed spines. The mammary formula, 2–2=8, is well shown in one specimen. In a hasty preliminary assorting of the collections, before skulls were cleaned, one of them was placed with *Chiromyscus chiropus* in the belief that it might be a young example of that animal and the two others fell among the supposed variations of *R. confucianus.* In all the large series of *confucianus* and *fulvescens* from Chapa, numbering well over one hundred specimens, invariably the tail is at least irregularly bicolored, so these two with dark tails were later eliminated.

The discovery that certain cranial characters were correlated with the dark tails established the distinctness of the species from *confucianus* and *fulvescens.* It is possible that further study will demonstrate a close relationship to *R. cremoriventer,* a dark-tailed species of the upper Malay Peninsula with which actual comparisons

have not been made. Apparently *cremoriventer* is smaller and more spiny, with weaker teeth and a narrower infraorbital plate. It seems not to have been recorded in any of the numerous collections from continental Siam.

The very small representation of this species in the collection is perhaps accounted for by the probability that its habits are more arboreal than is the case with the other rats of the region excepting *Chiromyscus*. It may not be especially allied to *Chiromyscus*, but in cranial characters there is little except size to separate it. In the British Museum are two specimens which may deserve further examination as possibly belonging to this species. One of these is from the Chin Hills, fifty miles west of Kindat, Burma (No. 16.3.26.58.) and the other from Margherita, Naga Hills, Assam (No. 20.6.7.34.).

Rattus sp. ?

A single specimen from Phong Saly, Laos, obviously belongs to a species not otherwise represented in the collection. Without material representing many of the species described from Siam, it seems best not to hazard an opinion as to its relationships. It is dull brown in color, the under parts uniformly with dark-based hairs tipped with buffy. The pelage is very soft and full, the ears rather large and the hind feet very large. The skull is relatively flat, with a broad braincase, small audital bullae, and heavy cheek-teeth. Collector's measurements are: total length 299; tail 153; hind foot 36.5.

Rattus surifer finis Kloss.

Epimys surifer finis Kloss, Proc. Zool. Soc. Lond., p. 51, March, 1916—Klong Menao, southeastern Siam.

K.-R.—Phong Saly, L. 2; Phouc Mon, Quangtri, A. 3.
DEL. 1931–32.—Thateng, L. 14 (8 alc.).

The specimens from Phong Saly are quite as bright-colored as typical *surifer*, but they agree with *finis* in the extension of white areas from the arms and legs to the hands and feet. The specimens from Quangtri are slightly smaller, darker, and with the under parts pure white instead of creamy. *Rattus s. siarma* (Kloss, Jour. Nat. Hist. Soc. Siam, 3, p. 75, 1918) of northwest Siam has not been examined. The specimens from southern Laos are soft-pelaged, practically without spines, and may be approaching *Rattus surifer moi* of southern Annam.

Rattus sabanus revertens Robinson and Kloss.

Rattus sabanus revertens Robinson and Kloss, Ann. Mag. Nat. Hist., (9), 9, p. 95, Jan., 1922—Daban, Phanrang, Annam.

K.-R.—Phong Saly, L. 1; Phouc Mon, Quangtri, A. 1.

Besides two specimens in Field Museum, there are from the same region four others in the British Museum, one from Backan, Tonkin, one from Napé, Laos, and two from Xieng Kuang, Laos. These northernmost representatives of the *sabanus* group, which is essentially Malayan, may be referred tentatively to *revertens* although comparison with the type of that form has not been made. Externally they are remarkably similar to *R. s. vociferans* of peninsular Siam and Tenasserim, but certain slight cranial characters seem to distinguish them. The root of the zygoma is somewhat weaker, the infraorbital plate averages narrower, more sloping, and the anterior palatine foramina are longer and more expanded laterally, in this last respect approaching some of the forms of *R. edwardsi*, notably *R. e. listeri*.

That there is any actual gradation between the *sabanus-vociferans* series and *edwardsi* is perhaps improbable, but their very close relationship is scarcely to be doubted. A somewhat cursory examination of the two groups leads to a pronounced feeling that they are quite distinct, but constant cranial characters that will hold for all the forms of both groups are difficult to define. Comparing only typical skulls of *edwardsi* and *vociferans*, it is found that *edwardsi* is larger, with a very heavy muzzle, large palatal slits, larger audital bullae, heavier molars and larger interparietal. In most cases, the size of the interparietal coupled with that of the molars is sufficient, but with forms like *listeri* in one series and like the present one in the other, confidence might be shaken if it were not for the coloration and external characters.

The single immature example from Quangtri, Annam, has the distal half of the tail white as in the unique type of *R. s. herberti* but shows no indication of extension of white to the eye as in that form.

Rattus sabanus subsp.

DEL. 1931–32.—Thateng, L. 2.

These may be regarded provisionally as intermediates between *R. s. revertens* and *R. s. herberti*. They are smaller and paler than *revertens*, the under parts are white rather than yellowish white, and

in one of them the white is only narrowly separated from the lower edge of the eye. The terminal part of the tail is white for two-thirds its length in one specimen and one-third in the other.

Rattus edwardsi Thomas. EDWARDS'S GIANT RAT.

Mus edwardsi Thomas, Proc. Zool. Soc. Lond., p. 587, pl. 44, 1882—Kuatun, Fukien, China.

K.–R.—Lieng San, T. 2; Muong Moun, T. 1; Phong Saly, L. 1.
D. & L. 1929–30.—Chapa, T. 16.

Five adults from Ngai Tio, Tonkin, in the British Museum seem nearest to typical *edwardsi* although, as suggested by Thomas (1925, p. 503), they tend somewhat towards *R. edwardsi listeri*. Color differences between *edwardsi* and *listeri* are difficult to appreciate, but in general *listeri* seems to be slightly more saturate with ruddier tones, less grayish than *edwardsi*. The skull of *edwardsi* differs from that of *listeri* in larger size, heavier molars, larger palatal slits, and larger audital bullae. In respect to the palatal slits the Tonkin specimens are nearer to *listeri*, but in all the other characters mentioned they are nearer to *edwardsi*. The type of *listeri* has an abnormally short toothrow, scarcely longer than in *vociferans*, but other specimens from Assam, as well as those representing *R. edwardsi garonum*, have somewhat larger molars, nearly or quite equaling those of the skulls from Tonkin.

The various forms of *R. edwardsi*, both continental and insular, might conveniently be regarded as subspecies. In most cases gradation is already apparent, while in others it is more than probable. The following list of them is perhaps incomplete, but may be helpful to the next worker with the group.

Rattus edwardsi Thomas, Kuatun, Fukien, China.
e. listeri Thomas, Pashok, Darjeeling, India.
e. garonum Thomas, Garo Hills, Assam.
e. gigas Satunin, near Lun-gan-fu, Szechwan.
e. ciliatus Bonhote, Gunong, Selangor, Malay States.
e. setiger Robinson and Kloss, Barison Range, Sumatra.
e. milleti Robinson and Kloss, Dalat, southern Annam.

Rattus bowersi latouchei Thomas. LATOUCHE'S GIANT RAT.

Mus latouchei Thomas, Ann. Mag. Nat. Hist., (6), **20**, p. 113, 1897—Kuatun, Fukien, China.

K.–R.—Chapa, T. 1; Phong Saly, L. 4.
D. & L. 1929–30.—Chapa, T. 18.

Specimens in the British Museum from Backan, Tonkin, Xieng Kuang, Laos, and Ngai Tio, Tonkin, all of which are called *bowersi* by Thomas, might better be referred to *latouchei* which is no more than a slight subspecies of *bowersi*. Perhaps *latouchei* may be somewhat paler in color than *bowersi* but otherwise it seems to differ only in one slight cranial character. In *bowersi* the nasals are extended posteriorly beyond the premaxillae whereas in *latouchei* the nasals and premaxillae end evenly. In this respect the Tonkin and Laos specimens agree with *latouchei* from Kuatun, Fukien, China.

The skull of *R. bowersi* is markedly different from that of *R. edwardsi* and other so-called "giant rats" of southeastern Asia. The braincase is peculiarly truncate behind, giving an essentially triangular appearance to the whole skull. The interparietal is frequently subtriangular with an anterior apex instead of being elliptical. The orbital ridges are rather weak and mainly confined to the frontals, their continuation over the parietals being faint. The audital bullae are relatively large and the incisors pale. A closely related species is *R. ferreocanus* of the Malay Peninsula, which has smaller audital bullae, but is otherwise so similar to *bowersi* that intergradation between the two is not improbable. Other species of smaller size and well distinguished, but having the same type of skull and similar external appearance, are *manipulus*, *mackenziei*, and *berdmorei*. *Rattus bowersi lactiventer* also has been named from northwestern Siam (Kloss, Jour. Nat. Hist. Soc. Siam, **3**, p. 80, 1919).

Chiromyscus chiropus Thomas. BURMESE CLIMBING RAT.

Mus chiropus Thomas, Ann. Mus. Civ. Stor. Nat. Gen., (2), **10**, p. 884, 1891; ibid., p. 935, pl. 11, figs. 4–7, 1892—Carin Hills, northeast of Tounghoo, southern Burma.

Chiromyscus chiropus Thomas, Proc. Zool. Soc. Lond., p. 503, 1925.

K.-R.—Ba Nam Nhung, T. 1.

D. & L. 1929–30.—Chapa, T. 1.

REC. 1925–29.—Bao Ha, T. 1; Dakto, A. 2; Xieng Kuang, L. 1.

With the exception of the type in alcohol, the specimens enumerated above include all the known examples of this interesting rat. One of the recent examples is the first female to be examined and affords the information that the mammary formula is 2–2=8.

Mus musculus Linnaeus. HOUSE MOUSE.

Mus musculus Linnaeus, Syst. Nat., ed. 10, **1**, p. 62, 1758.

K.-R.—Lai Chau, T. 1; Nguluko, Yunnan 9.

The only example of the common house mouse in the entire collection from Indo-China is one taken at Lai Chau by Coolidge. A small series was obtained in Yunnan by Stevens.

Mus bactrianus kakhyensis Anderson.

Mus kakhyensis Anderson, Anat. Zool. Res. W. Yunnan, p. 307, 1878—Ponsee, Kakhyen Hills, Yunnan.

Mus bactrianus kakhyensis Allen, Am. Mus. Novit., No. 270, p. 9, May, 1927.

K.-R.—Ba Nam Cai, T. 3; Muong Boum, T. 13; Muong Mo, T. 1; Muong Moun, T. 5; Phouc Mon, Quangtri, A. 6; Phong Saly, L. 1.

These agree in detail with specimens from Hainan referred to this subspecies by G. M. Allen.

The external resemblance of the Indo-Chinese specimens to species recently referred to "*Leggada*" (as *nitidulus* and *nagarum*) and also the cranial characters shown by them led to a somewhat hasty reexamination of the evidence for the separation of *Mus* and *Leggada* as full genera. This is a matter which Oldfield Thomas evidently had in mind for further investigation. In referring specimens from Tonkin and Annam to *Mus dubius*, he states (1927, p. 55): "This determination is of necessity merely provisional, as the complexities of the *Mus-Leggada* group are such as to demand quite a special study, with more material than is yet available."

Since the specimens which Thomas had in hand were obviously different from typical *dubius*, I am inclined to infer, from a considerable knowledge of his character and methods, that he refrained from definite action, not because of any doubt as to their distinctness from *dubius* and its allies, but because his faith was somewhat shaken as to the characters previously used in separating *Mus* and *Leggada*. It was this question that he wished to have subjected to careful study. I am unable to devote the time necessary for such a study, but, after a brief review of the Asiatic forms, am much impressed with the difficulties involved in maintaining any sharp line between *Mus* and *Leggada*. Their status is plainly only provisional and, under these circumstances, it seems less confusing to subordinate them to no more than subgeneric rank until such time as a comprehensive study can be made.

The present form, although doubtless properly placed as a subspecies of *bactrianus*, shows slight tendencies toward the characters of *Leggada*. However, there can be no doubt that it falls definitely

into the section *Mus*, as defined by Thomas (Jour. Bomb. Nat. Hist. Soc., **26**, pp. 417–420, May, 1919). The genotype of *Leggada* (*booduga*), on the other hand, is one of those species in which there is some approach to *Mus*, since it has rather broad, flattened nasals, a wide infraorbital plate which extends forward beyond the middle of the palatal slits, and a muzzle which, although longer than in typical *Mus*, is shorter than in most other species assigned to *Leggada*.

In the considerable series of *kakhyensis* now available, there is some variation in size. A series in the British Museum from Kontoun, southern Annam, appears very closely allied, but averages smaller, with skulls not so elongate as in the northern specimens from Tonkin.

Mus (Leggada) nitidulus annamensis Kloss.

Tautatus thai annamensis Kloss, Ann. Mag. Nat. Hist., (9), **9**, p. 99, 1922—Dalat, Langbian Plateau, Annam.

DEL. 1931–32.—Thateng, L. 3.

The names *thai* and *annamensis* (*Tautatus thai* Kloss, Jour. Nat. Hist. Soc. Siam, **2**, p. 280, Dec., 1917; idem, **3**, p. 71, 1918; *Tautatus thai annamensis* Kloss, supra cit.) seem to apply to forms of the *Leggada* series, and the generic name *Tautatus*, which was coupled with them is, therefore, an undoubted synonym of *Leggada*. This was the conclusion of Thomas, who left notes to this effect written on the margin of his personal copies of the original descriptions. Of *Tautatus thai*, he says, "Seems to be=*Leggada cooki* Ryley"; of *annamensis* his notation is, "Probably local race of *nitidula*."

The types of both *thai* and *annamensis*, with additional specimens, were submitted to Thomas for examination shortly before his death and are still in the custody of the British Museum where I have been privileged to examine them. The type of *annamensis* is imperfect about the palatal and infraorbital regions but is clearly a long-muzzled animal with the heavier molars which usually distinguish from *Mus*. A topotype accompanying it leaves no doubt that this is the case. It is dark-colored and short-tailed and doubtless recognizable specifically or subspecifically. A third specimen (No. 3,397) from Dalat, Annam, however, is plainly *Mus* and probably allied to *kakhyensis* like those from Kontoum, Annam.

The type of *thai* is quite immature and has the nasals shorter and the palatal slits more backwardly extended than usual in *Leggada*. A topotype with it is somewhat older and easily recognized as a *Leggada*. Careful examination of the two specimens is fairly

convincing that they are conspecific, the shortness of the nasals in the type being outweighed by the slenderness of its muzzle, the slender and pale-colored upper incisors, the relatively heavy molars, and the general size of the skull which is somewhat greater than in *Mus kakhyensis* of corresponding age. Therefore, both *thai* and *annamensis* fall into the *Leggada* section.

Three specimens from southern Laos, received too late for comparison with material in the British Museum, are tentatively referred to *annamensis*, this being regarded as a subspecies of *nitidulus*.

Mus (Leggada) pahari gairdneri Kloss.

Leggada pahari gairdneri Kloss, Jour. Nat. Hist. Soc. Siam, 4, p. 60, 1920—Me Taw, 40 miles n.w. of Raheng, Siam.

D. & L. 1929–30.—Chapa, T. 15.

REC. 1925–29.—Dakto, A. 1; Ngai Tio, T. 1; Xieng Kuang, L. 2.

The series from Chapa averages paler and more grayish than in typical *pahari* from Sikkim. This is the principal character noted in the two specimens forming the basis of the name *gairdneri*. It is probable, therefore, that the form covers a considerable area in Siam and Indo-China.

Dacnomys millardi ingens subsp. nov. LARGE-TOOTHED GIANT RAT.

Type from Phong Saly, Laos. No. 31,986 Field Museum of Natural History. Adult female. Collected May 1, 1929, by Russell W. Hendee. Orig. No. 5,485.

Diagnosis.—Similar in color to typical *millardi* of Sikkim; tail and ears shorter; skull shorter and heavier, with shorter nasals, broader interorbital space, heavier anterior zygoma root, and broader cheek-teeth.

Color.—Upper parts uniformly mixed Cinnamon-drab and dusky, producing a general effect of Fuscous to Bone Brown; hands and feet brownish; tail set with very short, sparse hairs, dusky with a few irregular pale blotches; under parts variegated, the throat, inner sides of arms, axillary and inguinal regions pure white to roots of hairs; forebreast and belly mixed cinnamon-drab and whitish, the hairs with pale slaty bases.

Skull.—As compared with an adult skull of *millardi* (not the type), the skull is shorter throughout; nasals shorter; anterior

zygoma root heavier; interorbital space wider; interparietal smaller and less produced forward; toothrow shorter and broader; anterior cheek-teeth slightly wider than the palatal space between them.

Measurements.—Type: total length 581; tail 308; hind foot 55; ear from notch (dry) 19.5. Skull of type and adult female of *millardi* (in parentheses): greatest length 55.8 (59.5); condylo-basal length 53.5 (55.6); zygomatic width 27.6 (27.5); nasals 21.5 x 6.8 (24 x 6.3); interorbital constriction 8.7 (7.8); interparietal 14.5 x 7.1 (15.8 x 10); diastema 15.2 (15.5); bony palate 12.1 (12.5); upper toothrow (alveoli) 11.8 (12.7); width of anterior cheek-tooth 4 (3.8).

Remarks.—The discovery of the rare giant rat known as *Dacnomys* in Indo-China is of considerable interest as an extension of the range of the genus. The single specimen collected by Mr. Hendee is an adult labeled female but in the prepared skin mammae are not evident. Fortunately a fully adult specimen of *millardi* is at hand for comparison. This was taken by Herbert Stevens on the recent C. Suydam Cutting Sikkim Expedition for Field Museum. The locality is Mangpu, Bengal Presidency, India, and the specimen apparently constitutes the third known example of the species. This specimen is mainly dark-colored below with only slight suggestion of the white markings shown by the type as described, so it is evident there is considerable variation in this respect. It is a little duller-colored and harsher-pelaged than the Indo-Chinese specimen, but distinctions of color seem very doubtful.

Comparison of the two skulls in hand reveals so many points of difference that the conclusion is unavoidable that they justify at least subspecific separation. Some of these differences may not hold good when series are examined, but if the recently obtained Indian specimen is at all representative, some of them must prove constant. Discrepancies between the measurements of the skull of this specimen and those of the type are perhaps due to the fact that it is fully adult while the type is said to be a "young adult."

Dacnomys wroughtoni of Assam, as described, is even larger than *millardi* and, therefore, still further removed from *ingens*.

?Bandicota sp.

The skin of a dark grayish rat in the Delacour and Lowe collection from Chapa, Tonkin, is without skull and practically unidentifiable even as to genus. A possibility is relationship to *Bandicota savilei curtata* of Raheng, Siam, from the description of which it seems

to differ at least in smaller size and darker color, the tail in the dried skin measuring only 122 mm. and the hands and feet being wholly blackish.

Bandicota nemorivaga Hodgson. SMALLER BANDICOOT RAT.

Mus (*Rattus*) *nemorivagus* Hodgson, Jour. As. Soc. Beng., 5, p. 234, 1836—Nepal.

K.–R.—Phong Saly, L. 2.

One of these is an adult female of moderate size and the other a very large old male, the latter unfortunately without skull. The measurements of this male are: total length 552; tail 258; hind foot 55. It is, therefore, much larger than any *nemorivaga* previously recorded and equals the size of members of the *gigantea* series represented in Indo-China by *jabouillei*. Color and detailed cranial characters, however, indicate relationship to *nemorivaga* rather than *jabouillei*. The female is closely similar in size, color, and other respects to specimens of *nemorivaga* in the original series from Nepal. There is also substantial agreement with specimens of *nemorivaga* from Tengyueh, Yunnan. The form called *mordax* (Thomas, Jour. Bomb. Nat. Hist. Soc., **24**, p. 642, 1916) from Chiengmai, northern Siam, is doubtless closely related or identical, but it is represented only by the type, an immature female which is insufficient to demonstrate its distinction from *nemorivaga*.

Bandicota gigantea jabouillei Thomas. JABOUILLE'S BANDICOOT RAT.

Bandicota jabouillei Thomas, Proc. Zool. Soc. Lond., p. 54, 1927—Tourane, Annam.

REC. 1925–29.—Dakto, A. 1; Tourane, A. 1.

Not represented in recent collections.

Apodemus speciosus orestes Thomas. CHINESE WOOD MOUSE.

Apodemus speciosus orestes Thomas, Abstr. Proc. Zool. Soc. Lond., p. 49, 1911; Proc. Zool. Soc. Lond., p. 136, 1912—Mount Omei, Szechwan.

K.–R.—Szechwan: Hlalong 1; Itze 1; Muli 6.

On account of slightly darker color, these are referred to *orestes* rather than *peninsulae* to which they show close general resemblance.

Apodemus agrarius chevrieri Milne-Edwards.

Mus chevrieri Milne-Edwards, Rech. Hist. Nat. Mamm., p. 288, pl. 40, fig. 2, 1868–74—Mouping, Szechwan.

K.–R.—Szechwan: Meti Long 1; Muli 1; Nien Yuen Fu 1. Yunnan: Nguluko 19; 45 miles north of Likiang 1; Yungning 3.

This unstriped member of the *agrarius* series has such close external resemblance to *orestes* that identification of individual specimens is quite uncertain without recourse to the skulls. The absence of the small antero-external tubercle of the second upper molar is usually conclusive.

Apodemus latronum Thomas. BIG-EARED WOOD MOUSE.

Apodemus speciosus latronum Thomas, Abstr. Proc. Zool. Soc. Lond., p. 49, 1911; Proc. Zool. Soc. Lond., p. 137, 1912—Tatsienlu, Szechwan.

K.–R.—Szechwan: Chaulu 1; Chelo 2; Kulu 12; Wushi 21. Yunnan: Lutzulu, bend of Yangtze 3; 25 miles north of Likiang 1; 45 miles north of Likiang 2; Nguluko 10.

The large size and especially the large blackish ears of this mouse distinguish it readily from either *agrarius* and its races or *speciosus* so far as represented in Field Museum. That it grades into *speciosus* seems very doubtful and it is perhaps more probable that it will prove related to the large European species *epimelas* or *flavicollis*, neither of which is available to me as this is written. The skull is characterized by a large wide braincase, long flat nasals, and rather large cheek-teeth. In most specimens traces of a fourth outer tubercle on the first upper molar can be seen. Specimens from Yunnan average slightly smaller than those from Szechwan.

Micromys minutus erythrotis Blyth. HARVEST MOUSE.

Mus erythrotis Blyth, Jour. As. Soc. Beng., 24, p. 721, 1855—Cherrapunji, Khasia Hills, Assam.

D. & L. 1929–30.—Chapa, T. 4.

These were received too late for direct comparison with Indian material and may be referred provisionally to *erythrotis*, the oldest name for any Asiatic *Micromys*. They are rather dark in color and the under parts are strongly washed with brownish Cinnamon, especially on the middle of the pectoral region.

Hapalomys delacouri pasquieri Thomas. PASQUIER'S TREE RAT.

Hapalomys pasquieri Thomas, Proc. Zool. Soc. Lond., p. 57, 1927—Xieng Kuang, Laos.

K.–R.—Phong Saly, L. 1.

REC. 1925–29.—Xieng Kuang, L. 1 (type).

A good adult male specimen makes it possible to redefine this form, which was based on a young example giving scarcely any indication of its true characters except as to the reduced size of the molars.

The color is essentially as in *delacouri*, possibly a little darker, with a slight suggestion of a dark eye-ring, a patch of dusky on the inner proximal half of the hind foot, and under parts which are light buff rather than white. The small, rounded ears are almost naked except for long sparse hairs which rise mainly from their margins, producing an unusual appearance.

The skull differs from that of *delacouri* in having a decidedly wider braincase, highly developed supraorbital ridges, short slender nasals, and a generally short and weak antorbital region. The molars are definitely smaller than in *delacouri* although there is some variation between the type of that form and another specimen from the type locality.

Measurements of an adult male from Phong Saly are: total length 292; tail 171; hind foot 22. Skull: greatest length 32; condylo-incisive length 29.7; zygomatic breadth 17.1; nasals 8.8; interorbital constriction 5.2; breadth of braincase 15.7; palatilar length 13.8; upper molar series 5.45; breadth upper premolar 1.85.

H. delacouri, described from Dakto, Annam, is not represented in the collection. *H. marmosa* from Hainan, of which the cranial characters are unknown, doubtless is closely allied.

Chiropodomys gliroides Blyth. PENCIL-TAILED TREE MOUSE.

Mus gliroides Blyth, Jour. As. Soc. Beng., 24, p. 721, 1855—Cherrapunji, Khasia Hills, Assam.

K.-R.—Muong Boum, T. 1; Muong Mo, T. 3; Muong Moun, T. 4; Phong Saly, L. 2.

REC. 1925–29.—Dakto, A. 6.

A single specimen from the Jaintia Hills, Assam, now in the British Museum, appears to be the only modern one typically representing this species. Aside from its somewhat brighter color, especially about the head and the sides of the face, it is in substantial agreement with the small series from Tonkin and Laos.

A series in the British Museum from southern Tenasserim, characterized by rather large general size and relatively small audital bullae, indicates that a southern subspecies should be recognized, probably under the name *Chiropodomys gliroides peguensis*.

Vandeleuria dumeticola scandens subsp. nov. LONG-TAILED CLIMBING MOUSE.

Type from Muong Boum, Tonkin. No. 32,452 Field Museum of Natural History. Adult male. Collected March 22, 1929, by Russell W. Hendee. Orig. No. 5,330.

Diagnosis.—Similar to *V. dumeticola*, but smaller; under parts tinged or washed with ochraceous instead of nearly pure white. Size about as in *V. sibylla*, but differing from that very small species in the shape of the braincase which is extremely inflated.

Color.—Upper parts, including ears and feet, Ochraceous Tawny; under parts creamy white lightly washed with ochraceous buff especially on the breast and interaxillary region; tail drabbish, slightly paler below than above.

Skull.—General form as in *V. dumeticola*, but braincase even more inflated and interorbital region correspondingly shortened; infraorbital plate short, scarcely projecting anteriorly; nasals short and narrow; incisive foramina short; teeth small, scarcely exceeding those of *V. sibylla*.

Measurements.—Type: total length 153; tail 92; hind foot (c.u.) 17. Skull of type: greatest length 19.1; condylo-incisive length 17.1; nasals 6; interorbital constriction 3.2; breadth of braincase 10.1; palatal foramina 2.7; upper molar series 3.1.

Remarks.—In addition to the type, three specimens essentially like it have been examined in the British Museum. These are from Thai Nien, Tonkin, and Xieng Kuang, Laos, collected in 1924–25 by Herbert Stevens and Willoughby Lowe. Three of the four specimens have a marked wash of ochraceous on the under parts. The third is a nursing female in somewhat worn pelage in which less of this wash appears, but it is quite evidently a character distinguishing from *dumeticola* in which nothing of the kind appears in a considerable series.

For the present, this form may be regarded as a subspecies of *dumeticola* with which it agrees in the form of its skull. This is contrary to usual procedure for there is considerable possibility that it may be quite distinct. Series of *dumeticola* from Nepal through Assam to Upper Burma are quite uniform in size and the sudden diminution shown by this form in Tonkin leaves some doubt that intergradation exists. Until further specimens are obtained, however, its obvious relationship to *dumeticola* is best expressed by the subspecific status.

With the possible exception of *V. sibylla*, this is the smallest member of the genus. The type of *sibylla* is in "spirit" and of little value for color characters, but its skull has a long narrow braincase, a wide and somewhat projecting infraorbital plate, and a thick rostrum, all indicating affinity to *oleracea* rather than to *dumeticola*.

Eothenomys (Anteliomys) custos hintoni subsp. nov. HINTON'S VOLE.

Type from Wushi, southwest of Tatsienlu, Szechwan, China. Altitude 12,000 feet. No. 33,073 Field Museum of Natural History. Adult female. Collected May 15, 1929, by Herbert Stevens. Orig. No. 322.

Diagnosis.—Similar to *E. custos*, but slightly larger (hind foot 18–20) and with a longer tail, this being about two-thirds the length of the head and body. Skull rather small (condylo-basal length 25 or less). Dentition somewhat as in *E. c. tarquinius*, the last upper molar with four inner and four outer salient angles.

Color.—Practically as in *custos* and *chinensis*, but feet paler. Upper parts grayish washed heavily with Wood Brown medially, this in some cases extending to sides; fore and hind feet drabbish white; tail dusky above and definitely lighter below; muzzle pale drabbish brown.

Skull.—Slightly larger than in *custos*, but much smaller than in *chinensis;* braincase rather high and narrow; interorbital region relatively wider than in *chinensis*, but with similar slightly elevated temporal ridges; nasals short, exceeded by ascending premaxillae; palate without median spine; molar pattern practically as in *E. c. tarquinius* and as in some specimens of *custos* but differing from the former in greater confluence of triangles and from most of the latter as well as from *E. wardi* in lacking any tendency to the development of an incipient fourth inner salient angle in the first upper tooth and a third one in the second upper tooth; last molar with four inner and four outer angles (in some specimens of *custos* and *rubellus* there are four inner angles and in others there are five).

Measurements.—Average of ten topotypes measured by the collector: total length 150.7 (147–158); tail 55.2 (51–59); hind foot 19.4 (19–20). Skull of type: condylo-basal length 24.8; zygomatic width 14.4; interorbital constriction 4.2; occipital width 11.4; nasals 7 x 3; diastema 7.6; diagonal length of audital bullae 6.4; upper molar series (crowns) 5.5.

Remarks.—In view of the number of named forms of *Eothenomys* "known only from the type locality" and the uncertainty as to the full maturity of individual specimens even when selected from considerable series, the conclusion that still another form should be named has been reached with some reluctance and only after a careful review of possible alternatives. A series of fifteen specimens is in hand, all from one locality and all of approximately the same age which seems to be that of maturity, although no very aged examples are included. On account of their relatively long tails, these were at first supposed to be allied to *chinensis*, from which they do not differ greatly in color, and the idea was entertained that they might stand in some connecting relation between *chinensis* and *A. wardi* of northwestern Yunnan, which appears more closely related to *chinensis* than to any other form. Owing to their small size, pale feet, etc., it was found quite impossible to refer them either to *chinensis* (*tarquinius*) or to *wardi*.

The real relationship of the new form appears to be with *E. custos* from which it is easily distinguished by its longer tail and its somewhat simplified molars. The dentition has some superficial resemblance to that of *E. c. tarquinius*, the last upper molar having four outer and four inner angles and the first and second molars showing no tendency to the development of fourth and third inner angles respectively. In the last molar, however, the third inner angle is usually confluent with the fourth outer, whereas in *tarquinius* the two are closed. In the fifteen specimens examined, two have the last upper molar with five inner angles as is commonly but not invariably the case in *E. custos*.

Eothenomys (Anteliomys) custos rubellus Allen.

Microtus (*Anteliomys*) *custos rubellus* Allen, Am. Mus. Novit., No. 133, p. 5, 1924—Ssushan, Likiang Range, Yunnan.

K.-R.—Yunnan: near Lutzulu, bend of Yangtze River 5; Nguluko 1; 25 miles north of Likiang 1; 45 miles north of Likiang 1; 60 miles north of Likiang 1.

These agree in cranial characters with topotypes of *rubellus*, but several of them are very light in color, having been taken in spring instead of fall, probably bridging any supposed color difference between *custos* and *rubellus*.

Eothenomys proditor Hinton.

Eothenomys proditor Hinton, Ann. Mag. Nat. Hist., (9), **11**, p. 152, 1923—Likiang Range, Yunnan.

K.–R.—Szechwan: Itze 2; Kulu 2. Yunnan: 25 miles north of Likiang 1; Nguluko 8.

Except for its slightly smaller size, there seems to be no external character to separate this species from *E. fidelis* which is found in the same region. The skulls also are remarkably similar in general conformation and there remains only the rather pronounced differences in the first and second upper molars, these having four and three inner triangles respectively in *fidelis* and three and two in *proditor*. In the last upper molars no constant difference is found. The first and second upper molars in *proditor*, therefore, are quite as in *Anteliomys* and the last molar is but slightly different from many specimens of *A. chinensis*. This makes the generic distinction of *Eothenomys* and *Anteliomys* very difficult and, with due deference to those who have devoted much study to microtines, I am inclined to treat them at most as subgenera.

Eothenomys melanogaster fidelis Hinton.

Eothenomys fidelis Hinton, Ann. Mag. Nat. Hist., (9), 11, p. 150, 1923—Likiang Range, Yunnan.

K.–R.—Szechwan: Kulu 2; Muli 4. Yunnan: Nguluko 1.

In average size, these specimens do not equal the extremes given for *fidelis* and it is probable some of them should be regarded as furnishing the expected indication of intergradation with *melanogaster*. In any case, there is little reason to doubt that such intergradation will be found and the retention of *fidelis* as a distinct species seems inadvisable. The specimens from Kulu, which appear fully developed, are larger than in *melanogaster* but considerably smaller than in typical *fidelis*. The last upper molar, however, is quite as in *fidelis*, with four inner salient angles instead of the three found in *melanogaster*. There is much variation in color, one specimen being bright "reddish" throughout and another (collected March 30) being in process of changing pelage passing from a reddish brown coat to a much darker shade.

Eothenomys melanogaster confini Hinton.

Eothenomys melanogaster confini Hinton, Ann. Mag. Nat. Hist., (9), 11, p. 151, 1923—Kiuchiang, Salween Divide, Yunnan.

K.–R.—Chapa, T. 1.

D. & L. 1929–30.—Chapa, T. 8.

Microtines, not hitherto recorded from Indo-China, were obtained only at one locality, a single specimen being taken by Hendee at

Chapa and a series of eight by Delacour and Lowe at the same place. The range of dates is from Nov. 27 to Feb. 13 and the earlier specimens are darker, less "reddish," than the later ones. In color and in size of skulls, there is much resemblance to *M. m. colurnus*, but the last upper molar in all cases has four salient inner angles. Among the skulls are several which nearly or quite reach the dimensions of the unique type of *M. m. miletus*. The arched form of this type, as a subspecific character, needs confirmation by additional specimens. A small series from Mucheng, Salween drainage, referred to *confini* by Allen, is uniformly smaller than the Tonkin series, perhaps indicating that the latter stand in a position intermediate between *confini* and *colurnus*.

Rhizomys pruinosus senex Thomas. HOARY BAMBOO RAT.

Rhizomys senex Thomas, Ann. Mag. Nat. Hist., (8), **16**, p. 313, Oct., 1915—near Mongtze, Yunnan.

K.-R.—Muong Boum, T. 3; Muong Mo, T. 4; Muong Moun, T. 10; Pa Ham, T. 1; Phong Saly, L. 8.

D. & L. 1929–30.—Chapa, T. 4; Hoi Xuan, A. 1; Huê, A. 1; Ke Saule, A. 2; Lung Lunh, A. 1; Pakha, T. 2.

REC. 1925–29.—Backan, T. 10; Bao Ha, T. 6; Dakto, A. 2; Ngai Tio, T. 18; Nganson, T. 7; Napé, L. 6; Xieng Kuang, L. 3.

WULSIN 1924.—Phong Saly, L. 1.

Tonkin specimens are quite the same as those from southeastern Yunnan whence this form was described. Since it differs from typical *pruinosus* of Assam only in somewhat increased size, its close relationship is best indicated by the subspecific status. The same is doubtless true of *latouchei* and *pannosus*.

Nyctocleptes sumatrensis cinereus McClelland. YELLOW-CHEEKED BAMBOO RAT.

Rhizomys cinereus McClelland, Calc. Jour. Nat. Hist., **2**, p. 456, 1842—Tenasserim.

Nyctocleptes cinereus Thomas, Ann. Mag. Nat. Hist., (8), **16**, p. 57, 1915.

K.-R.—Ba Nam Nhung, T. 2; Muong Mo, T. 2; Muong Moun, T. 2; Phong Saly, L. 1.

D. & L. 1929–30.—Hoi Xuan, A. 3.

DEL. 1931–32.—Banphone, L. 1; Thateng, L. 10.

Among these specimens are some, perhaps a majority, that are lighter in color than available examples from Tenasserim and Siam, but it is evident that variation due to age and pelage is considerable.

Specimens from the northern Shan States of Burma, doubtless representing the *erythrogenys* of Anderson, are much larger than any others examined, but the recognition of a separate form in that region is dubious. Southern specimens in general seem to be somewhat smaller than northern and to have the ferruginous of the head slightly deeper in shade.

Thomas (l.c.) proposed *Nyctocleptes* as a genus to include the nominal species *sumatrensis*, *cinereus*, and *insularis* which are so closely related that the genus may be considered as practically monotypic. Its distinction from *Rhizomys* rests mainly on characters of the plantar pads and mammae the significance of which may be a matter of opinion.

Although now represented by specimens from a number of localities, this strikingly colored bamboo rat appears not to have been recorded previously from Indo-China.

Hystrix (Acanthion) brachyurus subcristatus Swinhoe. SHORT-TAILED PORCUPINE.

Hystrix subcristatus Swinhoe, Proc. Zool. Soc. Lond., p. 638, 1870—Foochow, Fukien.

K.–R.—Muong Moun, T. 1; Phouc Mon, Quangtri, A. 1.
REC. 1925–29.—Backan, T. 1; Huê, A. 1.

The two specimens in hand are not fully mature and no direct comparisons have been made with material from other localities, so their reference to *subcristatus* is provisional. Apparently *brachyurus* of Malaysia, *klossi* of Tenasserim and Siam, *papae* of Hainan, and *subcristatus* of Fukien differ from each other, if at all, mainly in size, and the identification of individual specimens from intermediate localities is fairly hopeless.

Lönnberg's contention (Archiv. f. Zool., **15**, No. 18, 1923) that no sharp lines can be drawn in generic distinction of *Hystrix* and *Acanthion* seems well grounded and based on the examination of a large and varied number of species. The outward resemblance of certain species of *Acanthion* to *Hystrix* extends even to color and markings and with a wide variation in cranial characters, all of a relative nature, generic separation has little or no advantage.

The relationship of *Atherurus* to *Acanthion* is not very distant. A skull in Field Museum representing *Thecurus*(?) *crassispinis* from Borneo, which is externally much like *Acanthion*, has well-rooted molars and general similarity to *Atherurus*.

Atherurus macrourus stevensi Thomas. BRUSH-TAILED PORCUPINE.

Atherurus stevensi Thomas, Proc. Zool. Soc. Lond., p. 505, July 21, 1925—Ngai Tio, Tonkin.

Atherurus macrourus stevensi G. M. Allen, Am. Mus. Novit., No. 290, p. 1, Oct. 24, 1927.

K.-R.—Lai Chau, T. 1; Muong Moun, T. 1.

D. & L. 1929–30.—Chapa, T. 9.

DEL. 1931–32.—Thateng, L. 2.

REC. 1925–29.—Huê, A. 2; Napé, L. 1; Ngai Tio, T. 1 (type); Xieng Kuang, L. 1.

The specimen from Muong Moun has the under parts largely whitish and the "wool hairs," although not abundant, are whitish as described for the type of *stevensi*. The other specimens are darker with the white of the under parts confined mainly to the median line. Specimens from Laos and Annam have been referred by Thomas to *macrourus* and it is evident that the characters of *stevensi* are not yet well understood.

Lepus comus G. M. Allen. GRAY-TAILED HARE.

Lepus comus G. M. Allen, Am. Mus. Novit., No. 284, p. 9, Sept., 1927—Tengyueh, Yunnan.

K.-R.—Nguluko, Yunnan 1; Zumpa, near Kulu, Szechwan 1.

Two specimens of this interesting hare are in the collection. Their gray tails, gray rumps, and long hind feet leave no doubt of their identity although the dimensions of their skulls do not quite equal those given for the type.

Lepus comus grahami A. B. Howell.

Lepus grahami A. B. Howell, Proc. Biol. Soc. Wash., **41**, p. 143, Oct. 15, 1928—Ulongkong, Szechwan.

K.-R.—Ulongkong, Szechwan 1.

This specimen, a topotype of *grahami*, shows some indications of the slight color characters mentioned in the original description. Like the type of *grahami*, it was taken in July, while all available specimens of typical *comus* bear dates of March or April. It is not unlikely, therefore, that the differences will prove to be seasonal; but until further specimens are examined the name should perhaps be given the benefit of the doubt.

Lepus peguensis siamensis Bonhote. SIAMESE HARE.

Lepus siamensis Bonhote, Proc. Zool. Soc. Lond., p. 40, 1902—Chiengmai, Siam.

Lepus peguensis siamensis Chasen and Kloss, Jour. Nat. Hist. Soc. Siam, Suppl., 8, p. 76, 1930.

WULSIN 1924.—Vientiane, L. 2.
DEL. 1931–32.—Pakse, L. 2; Thateng, L. 1.

Two somewhat imperfect specimens in the small collection made by F. R. Wulsin for the United States National Museum agree closely with descriptions of this form which has been recorded from various localities in northern and central Siam. They were taken in July and are quite richly colored. Three specimens from southern Laos are in complete agreement with them.

Lepus peguensis vassali Thomas.

Lepus vassali Thomas, Ann. Mag. Nat. Hist., (7), 17, p. 425, April, 1906—Nhatrang, Annam.

K.–R.—Phouc Mon, Quangtri, A. 1.
REC. 1925–29.—An Binh, C.C. 1; Djiring, A. 2; Huê, A. 2; Kompong Thom, C. 3.

The distinction of this form from *siamensis* is not well established. The present specimen, as compared with those from Vientiane referred above to *siamensis*, is paler on the head, back, and sides and the black on the ears is reduced. The date, however, is January and some of this difference may be seasonal. The size is slightly smaller and the skull is shorter with somewhat broader nasals. Apparently there is little or no distinction in the amount of white on the belly, although this has been mentioned by Thomas (Proc. Zool. Soc. Lond., p. 58, 1927).

Ochotona thibetana zappeyi Thomas. ZAPPEY'S PIKA.

Ochotona zappeyi Thomas, Ann. Mag. Nat. Hist., (9), 9, p. 192, Feb., 1922—Shuowlow, northwest of Tatsienlu, Szechwan.

K.–R.—Big bend of Yangtze, near Lutzulu, Yunnan 1; Kulu, Szechwan 8.

Specimens from Szechwan and Yunnan south and west of Tatsienlu appear referable to this form which is barely recognizable on the basis of slight cranial characters. Specimens in the British Museum labeled *thibetana* are mostly from the Mekong-Yangtze

Divide and the Likiang Range, both in Yunnan. The type of *thibetana* came from Mouping and no subsequent specimens from that exact region have yet been taken. In the British Museum, however, is a specimen from "Twenty-three miles southeast of Tatsienlu" which has been compared with the type by Thomas and has on its label the following notation: "May be accepted as typical of *thibetana*. Skull precisely agrees with that of type sent for comparison from Paris. O. T. 12/21." Comparison of this skull with one of the present series from Kulu (which agrees essentially with a topotype of *zappeyi*) shows it to have a somewhat broader and deeper braincase, a flat, smooth interorbital region and slightly larger audital bullae. It may be assumed, therefore, that these characters distinguish *thibetana* from *zappeyi*, one being found eastward from Tatsienlu and the other westward and southwestward.

The small pikas of western China obviously fall into two specific groups typified by *thibetana* and *cansa*. The application of various binomial names to different forms of these two groups is confusing and serves to create the impression of much greater differentiation than really exists. Forms which seem so close to *thibetana* that subspecific rank is clearly indicated are *O. t. sacraria* (which, if recognizable, is doubtless confined to Mount Omei), *O. t. syrinx* (although compared with *cansa* in original description), *O. t. morosa* (although actually linked with *cansa* as a subspecies), and *O. t. sikimaria* (the skull of which is practically identical with that of *zappeyi*). *O. forresti*, which has been stated as allied to *thibetana*, is probably more closely related to *roylei*.

Ochotona cansa stevensi subsp. nov.

Type from Wushi, southwest of Tatsienlu, Szechwan, China. No. 33,098 Field Museum of Natural History. Adult male. Collected May 14, 1929, by Herbert Stevens. Orig. No. 317.

Diagnosis.—Similar to *O. cansa*, but skull longer, more slender, and less arched; audital bullae considerably smaller.

Color.—Practically as in *O. cansa*, the under parts, at least in winter, with a sharply defined breast stripe of fulvous.

Skull.—Narrow and elongate; nasals of moderate width; audital bullae small.

Measurements.—Average of ten adults measured by the collector: total length 146.3 (140–152); hind foot (s.u.) 26 (25–27); ear 18.5 (17–20). Skull of type: greatest length 35; condylo-incisive length

33.4; zygomatic width 15.9; nasals 11 x 4.3; interorbital constriction 3.6; width of braincase 12.7; palatal foramina 9 x 3.3; diagonal length audital bulla 9; upper cheek-teeth (alveoli) 6.6.

Remarks.—This form, which is the southernmost of the *cansa* group, is represented by a large series of thirty-eight from Wushi, two from Chaulu, which is between Wushi and Tatsienlu, and by a single specimen from Kwanchai, some distance northwest of Tatsienlu. It differs from typical *cansa* mainly in cranial characters among which the smaller audital bullae are most pronounced. Although the bullae are smaller than in *cansa*, they are practically the same size as in *O. c. sorella*, the unique type of which has been compared with that of *stevensi*. In *sorella*, however, the nasals are longer and narrower and the braincase slightly wider. Since the range of *cansa* intervenes between that of *sorella* and *stevensi*, it is altogether probable that further specimens of *sorella* will substantiate these apparently slight characters. Two immature specimens in Field Museum from Samsa Drok, Thibet, collected by R. B. Ekvall of Taochow, Kansu, have very small bullae but are too imperfect for exact determination.

Sus cristatus jubatus Miller. WILD BOAR.

Sus jubatus Miller, Proc. U. S. Nat. Mus., **30**, p. 745, 1906—Trang, lower Siam.

K.–R.—Lao Fou Chai, L. 1 (skull); Phouc Mon, Quangtri, A. 1 (skin and skull).

REC. 1925–29.—Djiring, A. 2; Phuquoc Island, C. 1.

The larger of these is a male with its last molar barely erupted. The upper length of the skull is 380 and the toothrow 115. Since these are almost exactly the measurements given for the type of *jubatus*, that name is used; but material in hand is too limited for any positive conclusions.

Tragulus kanchil affinis Gray. MOUSE DEER.

Tragulus affinis Gray, Proc. Zool. Soc. Lond., p. 138, 1861—Cambodia.

Tragulus kanchil pierrei Bonhote, Ann. Mag. Nat. Hist., (7), **11**, p. 293, 1903—near Bien Hoa, Cochin China.

Tragulus kanchil affinis Bonhote, Proc. Zool. Soc. Lond., p. 11, 1907—*pierrei* = *affinis;* Kloss, Proc. Zool. Soc. Lond., p. 63, 1916.

K.–R.—Tha Ngon, Vientiane, L. 1 (skull).

D. & L. 1929–30.—Hoi Xuan, A. 1; Huê, A. 2; Quangtri, A. 1.

DEL. 1931–32.—Thateng, L. 3.

REC. 1925–29.—Huê, A. 1; Kontoum, A. 2; Napé, L. 1; Phuqui, A. 1; Quangtri, A. 1; Thua Lua, A. 1.

Mouse deer from Indo-China are somewhat duller in color than in *ravus* and *affinis*. The heads, especially, are more grayish or brownish and more contrasted with the body. The dark nuchal area is rather well marked. Season may account for part of this. Material representing typical *affinis* is as yet rather unsatisfactory and it is not unlikely that it will be found to stand in directly intermediate position between *ravus* and the Indo-Chinese specimens. The skull from Vientiane does not reach the published dimensions of *williamsoni* (Kloss, Jour. Nat. Hist. Soc. Siam, **2**, p. 88, 1916) but it is somewhat larger than one from Annam and its identification is doubtful.

Muntiacus muntjak vaginalis Boddaert. BARKING DEER.

Cervus vaginalis Boddaert, Elench. Anim., 1, p. 136, 1785—Bengal, India.

K.–R.—Can Ho, T. 1; Muong Yo, L. 1; Phong Saly, L. 1.

D. & L. 1929–30.—Chapa, T. 2.

REC. 1925–29.—Backan, T. 4.

These are slightly paler than specimens of *vaginalis* from Darjeeling and Assam. Perhaps, therefore, they may be considered somewhat intermediate between *vaginalis* and *curvostylis* of Siam. Aside from general shade of color, the principal difference between *vaginalis* and *curvostylis* seems to be in the color of the legs, *vaginalis* having them brown in front for their whole length while *curvostylis* has the brown only on the lower part of the legs. In this character our specimens agree more closely with *vaginalis*. The front legs are brown anteriorly and ochraceous behind. The hind legs below the hock are brownish all around in two specimens while in the third there is a division much as in the front legs.

A specimen in the British Museum from Backan, Tonkin, is slightly brighter than others from higher elevations and has the brown of the fore legs much narrowed in its upper part. On the hind legs also the brown is reduced and confined to the front side. This specimen may also be interpreted as intermediate, in this case perhaps tending toward *M. m. nigripes*. Specimens from Chapa are of similar character.

Muntiacus muntjak annamensis Kloss.

Muntiacus muntjak annamensis Kloss, Ann. Mag. Nat. Hist., (10), 1, p. 399, March, 1928—Langbian Peak, Annam.

K.-R.—"Saigon," 3.
D. & L. 1929–30.—Thua Thien, A. 1.
DEL. 1931–32.—Thateng, L. 2.
REC. 1925–29.—Djiring, A. 1; Kontoum, A. 3; Tay Ninh, C.C. 2.

Three specimens received from Saigon are in the collection and probably came from the Lagna River or Flat Rock River near the base of the plateau northeast of Saigon. One is an adult male received from F. J. Defosse and the others are younger animals collected by Theodore Roosevelt.

In general body color these differ little from Tonkin specimens of *vaginalis*, but the legs and feet are noticeably different. Whereas the lower half of the legs is nearly uniform brownish in front in *vaginalis*, it is "reddish" with a median distal marking of blackish and a whitish spot above the cleft of the hoofs in *annamensis*. The pasterns behind and the area surrounding the dew claws also are blackish. Among specimens in the British Museum are several heretofore assigned to *curvostylis* which seem more nearly to agree with *annamensis*. By inference from the original description of *annamensis* it appears that typical *curvostylis* from southwestern Siam has the legs "dark brown below anteriorly."

Muntiacus muntjak nigripes G. M. Allen.

Muntiacus muntjak nigripes G. M. Allen, Am. Mus. Novit., No. 430, p. 11, Sept. 18, 1930—Nodoa, Hainan.

D. & L. 1929–30.—Hoi Xuan, A. 2.

Two fine males from the lowlands near the coast of northern Annam agree quite closely in color with the description of this form recently named from specimens taken on Hainan. The very dark legs and feet are in striking contrast to the tawny body color. The dark marking extends to the shoulder in front and to the "knee" on the hind legs. On the lower part of the legs, especially in front, there are scattered white hairs.

In size these mainland specimens are larger than the dimensions given for the type of *nigripes* from Hainan. This is, perhaps, only to be regarded as evidence of gradation toward *vaginalis*, and at least until much more material is examined, separation of another mainland form appears inadvisable. Specimens from Chapa, Tonkin,

which have been referred to *vaginalis*, are obviously intermediate in color.

The skulls of the specimens from Hoi Xuan have a condylo-basal length of about 200 mm., thus being about equal to that in *vaginalis*, but the toothrow is short, measuring only 61–62 as in *nigripes*.

Muntiacus rooseveltorum sp. nov. ROOSEVELT'S BARKING DEER.

Type from Muong Yo, Laos. Altitude 2,300 feet. No. 31,783 Field Museum of Natural History. Subadult male. Collected May 16, 1929, by Harold J. Coolidge, Jr. Orig. No. 89.

Diagnosis.—Characterized primarily by the great development of the mental glands (fig. 30) which are 1.25 inches in length on each side of the jaw and covered with stiff, close-standing, brownish hair 10 mm. long. Size intermediate between *M. muntjak* and *M. reevesi;* general color brownish, but the hairs annulated, producing a finely speckled effect over the entire body as in *M. reevesi;* skull with a relatively small preorbital pit as in *M. muntjak*, its anterior boundary about reaching the plane of the front of the second premolar; ascending branches of premaxillae separated from the nasals by a hooked process of the maxillary; nasals long and with only slight lateral expansion.

Color.—Similar in general to that of *M. reevesi*, but body with a more "reddish" tone and sides of face and antorbital region to rhinarium more brownish; body color approaching the Auburn of Ridgway, the hairs everywhere finely annulated and on close examination appearing minutely speckled; top of head, cheeks, and base of ears bright Ochraceous Tawny; tail with a narrow dorsal line approximately like the body color; under side of tail broadly white; under parts more grayish than upper parts, becoming darker, almost Fuscous, on middle of chest; fore legs and lower scapular region Mummy Brown, the hind side of the legs thinly and narrowly lighter; hind legs Mummy Brown to the hocks and thence halfway to the base of the tail; throat white; inguinal region white and a narrow, ochraceous-bordered white line extending down the inside of the hind leg to a point opposite the hock; a spot on chin between mental glands blackish brown; glands drabbish brown, the hairs paler basally.

Skull.—Intermediate in size between *M. reevesi* and *M. muntjak vaginalis* (toothrow 58.6); preorbital pit as in the *muntjak* series, relatively small, its anterior border about even with the front of the second premolar; upper part of lacrymal above and in front of pit

expanded into a nearly vertical plate 9 mm. in width; maxillo-lacrymal vacuity short and broad as in *muntjak*, not long and narrow as in *reevesi;* ascending premaxillae separated from nasals as in *reevesi*, not fully meeting nasals as in *muntjak;* nasals long and wider anteriorly than in either *muntjak* or *reevesi* and with only slight lateral expansion into maxillo-lacrymal vacuity, in this last respect being rather more like *reevesi.*

Measurements.—Collector's measurements of type: total length 1,024; tail 136; hind foot 349. Skull of type and specimens of *reevesi* and *vaginalis:*[1] greatest length 188, 171, 213; condylo-basal length 173, —, 200; zygomatic breadth 76, 70, 89.5; occiput to back of nasals

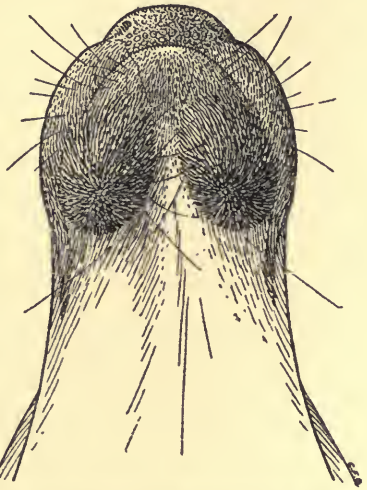

FIG. 30. Muzzle of *Muntiacus rooseveltorum* showing mental glands.

114.5, 105.2, —; length of nasals 55.8, 48.9, 50.8; length of palate from gnathion 113.2, —, 129; upper toothrow 58.6, 50.5, 68.

Remarks.—A diagnostic character of this species and a feature of very great interest are the pair of highly developed glandular brushes on either side of the chin. Although all muntjaks appear to have at least traces of such glands, they are usually so small and inconspicuous that heretofore they have not been noticed. So far as known, they do not occur in other ungulates and no observations in regard to them in the living animal are available. In the dry specimen they appear quite clean, dry, and free from any odor or secretion, but that they are outgrowths from a glandular base can

[1] The figures in second position are those of the type of *reevesi* and those in third position of a specimen of *vaginalis* from Phong Saly, Laos.

scarcely be doubted. They are oblong in shape and measure about 33 mm. x 22 mm. The hairs are tubular, very stiff and upstanding and their pointed tips are slightly curved. Depending from them are six to eight long, soft, exserted hairs about 30 mm. in length and entirely similar to others which are scattered on the sides of the nose. The brownish color of these tufts is in sharp contrast to the white and ochraceous of the throat and face, so they are very conspicuous. Their position naturally suggests that they may serve to distribute scent as the animal feeds, but at present this can be no more than an assumption.

In determining the relationships of this animal, the entire *muntjak* group has been somewhat cursorily reviewed. Aside from the very large and quite distinct species *crinifrons* and the very little known *feae* with its blackish color and supposed absence of frontal glands, all the described forms appear to fall into one or the other of two well-defined groups. These are represented by the names *M. muntjak* and *M. reevesi*. In Lydekker's Catalogue of Ungulates all the forms of the first series have been regarded as subspecies of *M. muntjak*, as it seems to me quite properly. But in the other series, several supposed distinct species are recognized upon rather scant basis. If *M. lacrymans* and *M. sinensis* had been included among the subspecies of *reevesi*, it would have been more consistent and more conducive to a clear understanding of the actual relationships. This has been commented upon by A. B. Howell (Proc. U. S. Nat. Mus., **75**, p. 75, 1929) and G. M. Allen (Am. Mus. Novit., No. 430, p. 12, 1930), the latter being disposed to reduce all the supposed forms of *reevesi* to synonymy.

As species, *M. muntjak* and *M. reevesi* in all their varieties differ not only in size and color but in important and unmistakable cranial characters. The cranial differences are mainly connected with the much larger relative size of the preorbital gland in *reevesi*. In the present species, *rooseveltorum*, there is a curious combination of these cranial characters of *muntjak* and *reevesi* which makes it difficult to be certain as to which it has greatest affinity. That it is very distinct from both seems amply evidenced by the extraordinary mental glands, but it shares one set of cranial characters with *muntjak* and another with *reevesi*. Further specimens will be of the highest interest.

Cervus eldi siamensis Lydekker. THAMENG DEER.

Cervus eldi siamensis Lydekker, Cat. Ungul. Brit. Mus., **4**, p. 104, 1915—southern Siam.

One skull bearing a fine pair of antlers is a part of the collection shipped from Saigon by Theodore Roosevelt.

Cervus porcinus annamiticus Heude. HOG DEER.

Hyelaphus annamiticus Heude, Mem. Hist. Emp. Chinois, 2, p. 50, 1888—Annam.

K.–R.—Lagna River, C.C. 3.

Three adults, collected May 19 by Theodore Roosevelt and C. Suydam Cutting, bear out the characters assigned to this form and indicate that it is quite well marked. As compared with Indian hog deer they are larger, more richly colored, and in summer pelage unspotted. A male, which is in very glossy coat, appears uniformly colored in direct view but oblique reflections reveal evidences of a spotted pattern. The animal is reported to be abundant, although recorded specimens preserved in museums are few.

Rusa unicolor equinus Cuvier. EASTERN SAMBUR DEER.

Cervus equinus Cuvier, Oss. Foss., ed. 2, 4, p. 45, pl. 5, figs. 37, 38, 1823—Sumatra.

K.–R.—Boun Tai, L. 5 (horns only); Flat Rock River, C.C. 1.

WULSIN 1924.—Makai, near Tha Khek, L. 2.

REC. 1925–29.—Djiring, A. 2.

Following Lydekker, the samburs of southern Indo-China may be referred for the present to the form originally described from Sumatra. The antlers examined agree in having the beams very heavy at the base and the spread is much less than usual in heads from India and Ceylon. A good pair measures 790 mm. (31 in.) in length of beam; the circumference above the burr is 190 (7.5 in.).

Rusa unicolor dejeani Pousargues. NORTHERN SAMBUR DEER.

Rusa dejeani Pousargues, Bull. Mus. Hist. Nat., Paris, 2, p. 12, 1896—Szechwan.

K.–R.—Chiulung (about lat. 29° 15′ N.), Szechwan 1.

A female in handsome coat (February 21) was shot by Theodore Roosevelt in northwestern Szechwan a few days' march southwest of Tatsienlu. Its color is very rich, dark brown with a broad line of still darker, almost blackish, down the middle of the back, and a wholly black, very bushy tail. Toward the hind quarters there is a very heavy suffusion of ochraceous. The legs are broadly brownish fawn in front and white behind. The hairs of the end of the tail reach a length slightly exceeding 6 in., those on the side about 4 in.

A pair of antlers without label is in the collection made by Stevens in western China. These measure 22 inches in length of beam. Two

specimens have been recorded recently (1930) by G. M. Allen from Yunnan and, although the characteristics of the race *dejeani* are still uncertain, it is evident the animals regularly range throughout western Yunnan and Szechwan. The Roosevelts, in notes published with the popular account of their trip, make the following statement: "Sambhur have a very wide range, and from the time we left Bhamo until we reached Ningyuan we were rarely out of sambhur country. We found sambhur signs at altitudes varying from four to fourteen thousand feet. Many of the horns we saw were both long and exceptionally massive."

Pseudois nayaur szechuanensis Rothschild. BURRHEL SHEEP.

Pseudois nahoor szechuanensis Rothschild, Ann. Mag. Nat. Hist., (9), **10**, p. 231, Aug., 1922—Szechwan, China.

Pseudois nayaur caesia A. B. Howell, Proc. Biol. Soc. Wash., **41**, p. 118, 1928—Minshan Range, Kansu, China.

K.-R.—Tsung Gu, east of Tatsienlu, Szechwan 3.

Two adult males and a younger male, all shot by Theodore Roosevelt, are in the collection. The horns measure about 25 inches in length and 12.5 inches in circumference at base. The skins are very dark in color, but the lateral stripe is not very widely interrupted. The white on the knees is reduced to a small spot margined with blackish or represented only by a few white hairs. It is fairly evident, therefore, that the northern race is considerably darker than the typical one.

Notes published by the Roosevelts include the following: "Burrhel or blue sheep we first heard of when we were leaving the Muli territory. They are known locally as *pan yang*. We saw heads and skins, and were told that if we wished to trek from a day to two days away from the trail we would find them plentiful. They live at about fourteen thousand feet elevation. Besides those shot two days north of Tatsienlu, we heard of them near Muping. They should also live in the mountains near Yehli, but there we saw neither hide nor horn."

The original description of this form was based on a mounted specimen from Szechwan and a skull from Shensi, both of which were mentioned as types. Applying the principle of page priority and considering the name chosen, the mounted specimen from Szechwan doubtless should be taken as the unique type. A later name *caesia* is now on the books, applied to specimens from Kansu which lies between Shensi and Szechwan. This emphasizes the need

for an exact type locality even though there may prove to be no recognizable differences between the animals of Szechwan, Kansu and Shensi. The name *caesia* apparently was proposed without knowledge of the earlier *szechuanensis* and may be regarded as a synonym.

Capricornis sumatraensis milne-edwardsi David. SEROW.

Capricornis milne-edwardsi David, Nouv. Arch. Mus. Hist. Nat., Paris, **5**, Bull., p. 10, 1869—Mouping, Szechwan.

K.-R.—Mount Gibboh, between Yungning and Muli, Szechwan 1; "Szechwan," 1 (skull).

The skin of a subadult male shot by Kermit Roosevelt in western Szechwan is richly colored with the lower legs Ochraceous Tawny and the side of the muzzle has the "tan-colored" spot regarded by Allen (Am. Mus. Novit., No. 410, p. 5, 1930) as characteristic of this form.

A skull obtained by Stevens is without exact locality. It is quite large, measuring 320 mm. in occipito-nasal length; zygomatic width 123; toothrow 96.5; horn over front curve 205 (8⅛ inches).

Capricornis sumatraensis maritimus Heude. SEROW.

Capricornis maritimus Heude, Mem. Hist. Emp. Chinois, **2**, p. 4, note, 1888; ibid., p. 226, 1894—Tonkin.

D. & L. 1929–30.—Ninh Binh, T. 2.

REC. 1925–29.—Langson, T. 1; Nong-bat-koo, L. 3 (frontlets); Than Hoa, A. 1; Vinh, A. 1.

One of these specimens which is in hand is subadult, but apparently represents a form of relatively small size and dark color. The head and body are mainly blackish with the hairs whitish at the base. The lower legs and rump are tawny and there are light maxillary stripes of mixed tawny and whitish. There are no tawny spots on the sides of the face. The teeth, so far as comparable in the specimens examined, are smaller than in other recognized forms.

Of the several names given by Heude to serows from Tonkin, *maritimus* appears to be the earliest and its use is perhaps justified even though the exact status of the form has not been worked out.

Bos (Bibos) banteng subsp. BANTING OX.

K.-R.—Flat Rock River, C.C. 2; Lagna River, C.C. 1.

WULSIN 1924.—Lai Chau, T. 1.

Three fine specimens, all females, were obtained by Theodore Roosevelt in southern Annam. A partly grown calf from Laos is in the Wulsin collection.

The name *laosiensis* (Heude, Mem. Hist. Emp. Chinois, 5, p. 3, 1901) is perhaps applicable to these specimens. In one of the cows above mentioned, the horns swing upward and inward to such an extent that the tips cross each other.

Bos (Bubalus) bubalis subsp. WATER BUFFALO.

K.–R.—Lagna River, C.C. 3.

Two males and a female collected by Theodore Roosevelt and C. Suydam Cutting have furnished the material for a mounted group in Field Museum. They stand about 4.5 feet at the shoulder, the body color is slaty or grayish rather than black, and the lower legs are pale. Uncertainty apparently exists as to whether or not the water buffalo of this region are feral. At least their exact classification without other material for comparison is quite hopeless.

Bos (Bibos) gaurus readi Lydekker. GAUR OX.

Bos gaurus readi Lydekker, Zoologist, (4), 7, p. 266, 1903—Burma.

K.–R.—Flat Rock River, C.C. 1.

Besides a fine male collected by Theodore Roosevelt, there are also in Field Museum, from the same region, a male collected by F. J. Defosse, two females collected and presented by C. Rydell, and a very large male and a small calf collected and presented by G. F. Ryan and George G. Carey, Jr.

Although the gaur is common and well known to sportsmen visiting the southern end of the plateaus of Annam, its occurrence there has received little mention in zoological literature. Blanford in the Mammals of India (1891, p. 485) says: "The eastern range of this species is not clearly known except that it is said to extend to Siam and, I believe, to Cochin China." Kloss, in writing on mammals from Siam, says: "Practically all Siamese specimens have been obtained in the north or west." Lydekker's Catalogue of Ungulates records no eastern specimens.

In the absence of comparative material, the name of the Burmese race has been arbitrarily applied to the specimens at hand.

Manis pentadactyla subsp. PANGOLIN.

K.–R.—Muong Tia, T. 1; Nam He, T. 1 (flat skin only); Phong Saly, L. 2.

These are somewhat larger than *M. p. dalmanni* of southeastern China as defined by G. M. Allen (Am. Mus. Novit., No. 429, p. 6, 1930) and perhaps are nearer to *M. p. pusilla* of Hainan of which no specimens are in hand. The largest has the following dimensions taken by the collector: total length 718; tail 270; hind foot 71. The skull has a condylo-basal length of 85, whereas Allen states that Fukien skulls average 74 and Hainan skulls 82. The scales around the body are uniformly in series of 13 while the number in the Burmese form *aurita* is said to be 15–18.

Paramanis javanica Desmarest. PANGOLIN.

Manis javanica Desmarest, Mamm., p. 377, 1822—Java.

DEL. 1931–32.—Thateng, L. 1.

REC. 1925–29.—Kontoum, A. 2; Tay Ninh, C.C. 1.